

The Bayne-Sylvester Arithmetic

Grade VII

D. C. Heath & Co.



Class QA103

Book 1 B3

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THE BAYNE-SYLVESTER ARITHMETIC

BY

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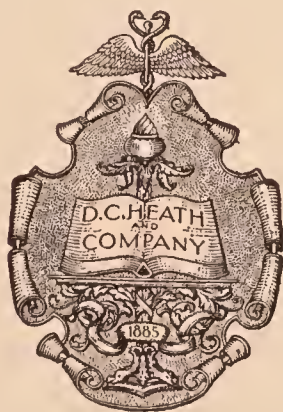
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SEVENTH GRADE

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INTRODUCTION

The Bayne-Sylvester Arithmetics have been written with the distinct purposes (1) of so grading arithmetical difficulties as to make the approach to new processes simple, and (2) of so arranging the material as to offer means for self-diagnosis of weakness and immediate remedy.

Scope. — The series is based on the most recent investigations in the field of number combinations and in problem solving. It frankly discards the theme of “arithmetic for arithmetic’s sake” and accepts as a proper objective “arithmetic for everyday use.” Recognizing that the life of the average person today is rarely concerned with large numbers, with many decimal places, with denominations of undue size, the authors have limited the work in these fields to practical numbers, to decimals of reasonable size, and to fractions common in business transactions. Nevertheless, they are aware of the informative and socializing values of arithmetic, and a number of topics which were formerly taught for the purpose of developing skill in computation are given for information only. Thus the right of the child to know these processes and phases of business life is acknowledged, but the child is no longer required to perform laborious computations that the adult seldom needs to use.

Use of Problems. — New processes are developed through problems that are interesting to children and expressed in language that they can easily comprehend. In this way the value of the process which he is to master is impressed upon the child. Specific training in problem solving is provided throughout the series. Methods of solution are those that have been

thoroughly tested and accepted, rather than those that appeal because of novelty. The problems are so arranged as to make the pupil recognize that there is essentially little difference between what have been termed "oral" and "written" problems. By introducing problems with the admonition "Use pencil when needed," this unity of problem work is stressed.

Test Drills. — The Test Drills represent the result of study over a period of several years. They offer to the child a means of diagnosing for himself his difficulty in any fundamental process, and supply him with abundant material for drill, not on the entire process, but on the specific step of the process in which he has failed. This material for drill is incorporated in the diagnostic test itself; there is no necessity to turn to some other portion of the text for remedial work. Each example is designed to test a particular step in a given mathematical process, and is divided into several similar parts. The teacher directs the class to do the part of each example that appears in the column headed A, or B, or C, etc. If a pupil makes a mistake in any example assigned, he must do the example again correctly and then do also the parts of the same example that appear in the other columns. Thus, if the teacher assigns Part C and the pupil makes an error in Example 3, he must not only do Part C of Example 3 correctly, but he must also do Parts A, B, D, etc.

Individual Differences are specifically cared for by the Test Drills and by additional examples, many of which call for work beyond the grade limits. Such examples are indicated by asterisks. The use of the graph, now a required form of mathematical training, is fully developed in this connection.

Silent Reading in arithmetic textbooks as a part of the "work type" of reading is found in many new courses of study. This series offers definite correlative exercises. Problems without numbers, problems requiring the formulation of the question, and problems calling only for the indicated solution serve as valuable material for silent reading.

Tests. — Beginning with the books for the fourth grade, sample achievement tests are given in each volume. These will serve as type tests for use by teachers from time to time in getting a cross section of the work of the class. Satisfactory performance in these tests is a guaranty that the pupil has grasped the essentials of the work for the grade.

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THE BAYNE-SYLVESTER ARITHMETIC

SEVENTH GRADE — PART I

1. Numeration and Notation

Numeration is the reading of numbers; *notation* is the writing of numbers.

Numbers may be written in several ways:

- 1. In words, as: five, seventeen.
- 2. In the Arabic notation, as: 5, 17.
- 3. In the Roman notation, as: V, XVII.

The Arabic notation derives its name from the Arabs, who introduced it into Europe. It is a decimal system, based on groups of tens. The value of each order is ten times as great as the value of the next order to the right.

<i>Billions' Period</i>	<i>Millions' Period</i>	<i>Thousands' Period</i>	<i>Units' Period</i>
Hundred Billions Ten Billions Billions	Hundred Millions Ten Millions Millions	Hundred Thousands Ten Thousands Thousands	Hundreds Tens Units
75,	308,	756,	205

We read this number as follows: *seventy-five billion, three hundred eight million, seven hundred fifty-six thousand, two hundred five.*

The numbers are pointed off into periods so that they may be more easily read. Each period consists of ____ orders.

1. Read these numbers, which give the altitudes and areas of some of the African lakes:

Lake	Altitude (Height above Sea Level)	Area
Victoria	3700 ft.	26,800 sq. mi.
Tanganyika	2500 ft.	12,300 sq. mi.
Nyassa	1600 ft.	10,300 sq. mi.
Chad	850 ft.	10,000 sq. mi.

2. Which lake is highest above sea level? Which is next highest? Which lake is largest in area? Which is smallest?

3. Read the following:

Continent	Area
North America	9,031,000 sq. mi.
South America	6,856,000 sq. mi.
Europe	3,842,000 sq. mi.
Asia	17,512,000 sq. mi.
Africa	11,510,000 sq. mi.
Australia	3,455,000 sq. mi.

4. Rewrite this list, placing the continents in order according to area, beginning with the smallest.

5. The area of North America is about ____ that of Asia.

6. The area of Asia is about ____ times as great as that of Australia.

2. Decimals

In your work in arithmetic you will use decimals frequently. It is important, therefore, that you know *how* to use them.

A decimal is a fraction. Its denominator is 10 or some power of 10. A power of a number is the number multiplied by itself. For example, 100 is a power of 10 because it is equal to 10×10 ; similarly, 1000 is a power of 10 because it is equal to $10 \times 10 \times 10$. The understood denominator of a decimal, therefore, is 10, 100, 1000, 10,000, 100,000.

In writing a *common* fraction, both terms are expressed, as: $\frac{3}{4}$, $\frac{7}{10}$, $\frac{3}{100}$. In writing a *decimal* fraction, only the numerator is expressed. The denominator is understood, and is determined by the number of decimal places. A decimal fraction takes its name from its understood denominator.

$$\frac{7}{10} = .7 \quad \frac{7}{100} = .07 \quad \frac{7}{1000} = .007 \quad \frac{7}{10000} = .0007$$

The period used in decimals is called the *decimal point*.

1. Complete these statements:

(a) A fraction with an unexpressed _____ which is 10 or some power of 10 is called a _____ fraction.

(b) In a decimal fraction only the _____ is expressed.

(c) The decimal fraction takes its name from the _____ which is _____.

(d) The period used in a decimal fraction is called the _____.

(e) The denominator of a decimal fraction is determined by the _____ of _____.

Billions	Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Units	<i>and</i>	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths
----------	------------------	--------------	----------	-------------------	---------------	-----------	----------	------	-------	------------	--------	------------	-------------	-----------------	---------------------

2. Read: .034 .0034 .00034

The following are mixed decimals:

75.84 70.084 700.584

A zero is often placed before a decimal point to call attention to it:

0.07 0.75 0.5 0.13

Zeros may be annexed to a decimal without changing its value:

.6 = .60 .08 = .080

3. Which pairs of numbers in the list below have the same values?

- | | | | |
|---------|----------------|---------|----------------|
| (a) .5 | .50 | (d) 5 | 50 |
| (b) .01 | .1 | (e) .6 | $\frac{6}{10}$ |
| (c) .07 | $\frac{7}{10}$ | (f) .75 | $\frac{3}{4}$ |

4. Read the following statements:

- (a) A grain elevator contains 3749.55 bu. of wheat.
- (b) An automobile map gives the following information concerning the distance between certain places: Boston to Springfield, 94.7 mi.; Springfield to Pittsfield, 56.0 mi.

3. The Roman Notation

The Roman system of notation above 12 is used chiefly for (1) numbering the chapters of books; (2) numbering the volumes in a series of books, as in the case of encyclopedias; (3) expressing dates in their formal use, as on monuments and on the cornerstones of buildings.

In the Roman system the following seven letters, which are always *capital* letters, are used:

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

Complete the following statements:

1. When a letter is repeated, its value is ____.

$$\begin{array}{lll} \text{I} = 1 & \text{X} = 10 & \text{C} = ? \\ \text{II} = ? & \text{XXX} = ? & \text{CC} = ? \end{array}$$

2. When a letter of smaller value precedes a letter of greater value, the value of the smaller is ____ the value of the larger.

Apply the rule in these examples:

$$\begin{array}{llll} \text{V} = ? & \text{X} = ? & \text{L} = ? & \text{C} = ? \\ \text{IV} = ? & \text{IX} = ? & \text{XL} = ? & \text{XC} = ? \end{array}$$

3. When a letter of smaller value follows a letter of greater value, the value of the smaller is ____ the value of the larger.

Apply the rule in these examples:

$$\begin{array}{llll} \text{V} = ? & \text{X} = ? & \text{L} = ? & \text{C} = ? \\ \text{VI} = ? & \text{XIII} = ? & \text{LX} = ? & \text{CX} = ? \\ \text{VIII} = ? & \text{XVI} = ? & \text{LXXIX} = ? & \text{CXLVI} = ? \end{array}$$

4. Practice Exercises on Reduction of Fractions

Without pencil. Supply the missing numbers:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
1.	$\frac{7}{8} = \frac{?}{56}$	$= \frac{?}{64}$	$= \frac{?}{48}$	$= \frac{?}{24}$	$= \frac{?}{40}$	$= \frac{?}{32}$	$= \frac{?}{16}$
2.	$\frac{4}{5} = \frac{8}{?}$	$= \frac{?}{15}$	$= \frac{16}{?}$	$= \frac{?}{30}$	$= \frac{20}{?}$	$= \frac{?}{35}$	$= \frac{32}{?}$
3.	$\frac{6}{7} = \frac{12}{?}$	$= \frac{?}{49}$	$= \frac{30}{?}$	$= \frac{?}{42}$	$= \frac{24}{?}$	$= \frac{18}{?}$	$= \frac{?}{56}$

Reduce both fractions in each group to fractions having a common denominator:

	(a)	(b)	(c)	(d)
4.	$\frac{1}{2}, \frac{1}{4}$	$\frac{3}{4}, \frac{4}{5}$	$\frac{1}{8}, \frac{5}{6}$	$\frac{1}{3}, \frac{1}{6}$
5.	$\frac{2}{3}, \frac{3}{5}$	$\frac{5}{6}, \frac{3}{4}$	$\frac{1}{8}, \frac{1}{4}$	$\frac{1}{2}, \frac{1}{7}$
6.	$\frac{8}{9}, \frac{5}{6}$	$\frac{2}{3}, \frac{7}{15}$	$\frac{2}{3}, \frac{3}{8}$	$\frac{3}{4}, \frac{5}{6}$
7.	$\frac{5}{6}, \frac{7}{8}$	$\frac{4}{9}, \frac{3}{4}$	$\frac{3}{4}, \frac{5}{7}$	$\frac{4}{5}, \frac{3}{8}$

Reduce the following fractions to lowest terms:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
8.	$\frac{27}{30}$	$\frac{16}{24}$	$\frac{18}{28}$	$\frac{16}{32}$	$\frac{12}{15}$	$\frac{27}{36}$	$\frac{15}{30}$	$\frac{28}{30}$
9.	$\frac{16}{20}$	$\frac{3}{24}$	$\frac{18}{20}$	$\frac{72}{75}$	$\frac{9}{12}$	$\frac{24}{56}$	$\frac{60}{75}$	$\frac{12}{20}$
10.	$\frac{33}{44}$	$\frac{16}{28}$	$\frac{18}{40}$	$\frac{24}{42}$	$\frac{15}{45}$	$\frac{8}{40}$	$\frac{3}{42}$	$\frac{16}{18}$

Reduce to whole or mixed numbers:

11.	$\frac{16}{15}$	$\frac{8}{3}$	$\frac{12}{4}$	$\frac{9}{5}$	$\frac{27}{8}$	$\frac{16}{2}$	$\frac{14}{3}$	$\frac{15}{3}$
12.	$\frac{27}{2}$	$\frac{48}{5}$	$\frac{19}{6}$	$\frac{32}{5}$	$\frac{45}{8}$	$\frac{26}{3}$	$\frac{17}{4}$	$\frac{27}{9}$
13.	$\frac{25}{5}$	$\frac{43}{7}$	$\frac{16}{3}$	$\frac{27}{8}$	$\frac{24}{20}$	$\frac{18}{15}$	$\frac{36}{15}$	$\frac{23}{18}$

Change to improper fractions:

14. $5\frac{1}{4}$ $8\frac{2}{3}$ $6\frac{1}{8}$ $3\frac{4}{7}$ $5\frac{1}{2}$ $7\frac{2}{3}$ $2\frac{5}{6}$ $7\frac{3}{4}$
15. $6\frac{2}{5}$ $3\frac{1}{8}$ $5\frac{4}{5}$ $7\frac{4}{9}$ $8\frac{3}{4}$ $6\frac{5}{8}$ $6\frac{7}{8}$ $3\frac{4}{5}$

Change to 12ths:

16. 4 6 8 9 12 3 2 1

5. Review of Common Fractions

If you find examples with common fractions hard to do, it may be that you cannot work with fractions as you should. By doing the examples in any one column that you may choose in this exercise, you can discover where you are weak.

	A	B	C	D	E
1. Reduce to lowest terms:	$\frac{14}{32}$	$\frac{24}{56}$	$\frac{45}{75}$	$\frac{16}{48}$	$\frac{34}{50}$
2. Supply the missing numerator:	$\frac{3}{8} = \frac{?}{24}$	$\frac{5}{7} = \frac{?}{42}$	$\frac{9}{10} = \frac{?}{40}$	$\frac{6}{7} = \frac{?}{56}$	$\frac{3}{5} = \frac{?}{40}$
3. Rewrite each group as like fractions:	$\frac{5}{8}, \frac{4}{5}$	$\frac{6}{7}, \frac{4}{5}$	$\frac{8}{9}, \frac{3}{4}$	$\frac{5}{8}, \frac{6}{7}$	$\frac{3}{4}, \frac{4}{7}$
4. Reduce the following fractions:	$\frac{18}{6}$ $\frac{15}{7}$ $\frac{18}{12}$	$\frac{54}{6}$ $\frac{21}{5}$ $\frac{24}{20}$	$\frac{72}{8}$ $\frac{56}{15}$ $\frac{48}{15}$	$\frac{36}{9}$ $\frac{29}{4}$ $\frac{26}{12}$	$\frac{28}{7}$ $\frac{82}{9}$ $\frac{54}{16}$
5. Supply the missing number:	$7 = \frac{?}{4}$	$9 = \frac{36}{?}$	$5 = \frac{45}{?}$	$12 = \frac{60}{?}$	$5 = \frac{?}{7}$
6. Change to an improper fraction:	$12\frac{2}{7}$	$16\frac{1}{2}$	$14\frac{4}{5}$	$18\frac{2}{3}$	$19\frac{3}{8}$

6. Addition of Fractions

A.		B.	
$\begin{array}{r|l} 5\frac{7}{12} & 7 \\ 7\frac{1}{4} & 3 \\ \frac{1}{6} & 2 \\ \hline 13 & \frac{12}{12} = 1 \end{array}$		$\begin{array}{r|l} 3\frac{1}{2} & \frac{15}{30} \\ 4\frac{1}{6} & \frac{5}{30} \\ 5\frac{3}{5} & \frac{18}{30} \\ \hline 12 & \frac{38}{30} = 1\frac{8}{30} = 1\frac{4}{15} \\ \frac{1}{15} & \\ \hline 13\frac{4}{15} & \end{array}$	
		or	$\begin{array}{r|l} 3\frac{1}{2} & 15 \\ 4\frac{1}{6} & 5 \\ 5\frac{3}{5} & 18 \\ \hline 13\frac{4}{15} & \frac{38}{30} = 1\frac{4}{15} \end{array}$

Remember:

- 1. Only like fractions may be added.
- 2. Add only the numerators.
- 3. Reduce the fraction in the answer to lowest terms.
- 4. Check your work by going over it again.

Without pencil.

- 1. Alice earned \$2½ one afternoon and \$¾ for an extra hour in the evening. How much did she earn that day?
- 2. Mary weighed 87¾ lb. The next time she weighed herself she found she had gained ⅝ lb. How much did she weigh the second time?
- 3. Fred carried home two packages. One weighed 5½ lb.; the other weighed 2½ lb. What was the total weight of the packages?
- 4. Walter walked to Robert's home, a distance of 2¼ mi. Then both boys walked to Frank's home, which was 1⅝ mi. distant from Robert's. How far had Walter walked when he reached Frank's home?
- 5. Alice practiced at the piano 1½ hr. on Monday and 1⅓ hr. on Tuesday. How many minutes did she practice all together?

7. Practice in Adding Fractions

How many examples can you do correctly in 10 minutes? First, begin with Column A, and when you have finished, go on to Column B. Then try again, beginning with Column B and continuing to Column C. Each column has twenty examples. Don't forget to turn the page.

Without pencil. Write the answers only.

A	B	C
1. $\frac{5}{12} + \frac{3}{12} + \frac{3}{12}$	$\frac{4}{15} + \frac{3}{15} + \frac{7}{15}$	$\frac{3}{10} + \frac{2}{10} + \frac{4}{10}$
2. $\frac{2}{3} + \frac{2}{3} + \frac{1}{3} + \frac{1}{3}$	$\frac{5}{8} + \frac{3}{8} + \frac{7}{8} + \frac{1}{8}$	$\frac{4}{5} + \frac{4}{5} + \frac{7}{5}$
3. $\frac{5}{6} + \frac{3}{6} + \frac{3}{6}$	$\frac{3}{10} + \frac{1}{10} + \frac{7}{10}$	$\frac{5}{8} + \frac{7}{8} + \frac{3}{8}$
4. $\frac{1}{10} + \frac{3}{10} + \frac{11}{10}$	$\frac{4}{9} + \frac{3}{9} + \frac{5}{9}$	$\frac{3}{12} + \frac{5}{12} + \frac{7}{12}$
5. $\frac{1}{2} + \frac{1}{4}$	$\frac{1}{4} + \frac{1}{8}$	$\frac{1}{5} + \frac{1}{10}$
6. $\frac{2}{3} + \frac{1}{6}$	$\frac{3}{4} + \frac{1}{8}$	$\frac{5}{6} + \frac{1}{2}$
7. $\frac{1}{3} + \frac{1}{6}$	$\frac{1}{4} + \frac{1}{12}$	$\frac{1}{6} + \frac{1}{2}$
8. $\frac{1}{3} + \frac{1}{5}$	$\frac{1}{3} + \frac{1}{8}$	$\frac{1}{4} + \frac{1}{5}$
9. $\frac{3}{8} + \frac{1}{3}$	$\frac{1}{3} + \frac{3}{7}$	$\frac{1}{2} + \frac{2}{9}$

Use pencil if needed.

10. $\frac{2}{3} + \frac{1}{5} + \frac{2}{15}$	$\frac{1}{6} + \frac{2}{3} + \frac{1}{12}$	$\frac{1}{5} + \frac{1}{2} + \frac{1}{10}$
11. $\frac{1}{8} + \frac{1}{6} + \frac{1}{4}$	$\frac{1}{2} + \frac{1}{6} + \frac{1}{4}$	$\frac{1}{4} + \frac{1}{2} + \frac{1}{5}$
12. $\frac{1}{3} + \frac{2}{5} + \frac{1}{6}$	$\frac{7}{8} + \frac{1}{6} + \frac{1}{3}$	$\frac{1}{2} + \frac{2}{9} + \frac{1}{6}$
13. $7\frac{3}{8} + 2\frac{2}{8} + 3\frac{2}{8}$	$6\frac{1}{5} + 8\frac{2}{5} + 5\frac{1}{5}$	$7\frac{1}{6} + 8\frac{3}{6} + 2\frac{1}{6}$
14. $8\frac{2}{7} + 1\frac{3}{7} + 6\frac{5}{7}$	$8\frac{4}{9} + 6\frac{5}{9} + 1\frac{2}{9}$	$7\frac{1}{4} + 8\frac{3}{4} + 1\frac{3}{4}$

	A	B	C
15.	$7\frac{3}{8} + 5\frac{7}{8} + 9\frac{2}{8}$	$5\frac{7}{12} + 2\frac{5}{12} + 6\frac{3}{12}$	$8\frac{2}{10} + 6\frac{5}{10} + 3\frac{7}{10}$
16.	$6\frac{1}{3} + 8\frac{2}{5} + 3\frac{2}{15}$	$6\frac{1}{8} + 5\frac{1}{4} + 3\frac{1}{2}$	$2\frac{1}{2} + 7\frac{1}{9} + 7\frac{1}{6}$
17.	$12\frac{1}{5} + 6\frac{1}{2} + 8\frac{1}{10}$	$4\frac{1}{5} + 7\frac{4}{15} + 8\frac{1}{3}$	$3\frac{3}{8} + 6\frac{1}{4} + 9\frac{2}{16}$
18.	$2\frac{1}{2} + 2\frac{5}{6} + 4\frac{2}{3}$	$5\frac{2}{3} + 8\frac{4}{5} + 6\frac{8}{15}$	$9\frac{3}{4} + 6\frac{4}{5} + 8\frac{3}{10} + 6\frac{3}{20}$
19.	$7\frac{1}{2} + 8\frac{1}{3} + 5\frac{1}{9}$	$3\frac{1}{4} + 7\frac{3}{8} + 5\frac{1}{6}$	$2\frac{1}{2} + 6\frac{1}{5} + 5\frac{1}{4}$
20.	$3\frac{5}{8} + 1\frac{4}{5} + 6\frac{1}{4}$	$7\frac{3}{8} + 9\frac{1}{6} + 3\frac{2}{9}$	$6\frac{1}{4} + 3\frac{3}{7} + 6\frac{5}{8}$

8. How to Use the Step-by-Step Test Drills

On the next page you will find a step-by-step test drill.

Under the direction of your teacher, begin with Example 1 in the column selected. Each column has a series of graded examples. Each example has a kind of difficulty in it differing from the one preceding it. Work as rapidly as you can, but make sure that each example is correctly done before you go to the next step. When you are told to stop, check your results with your teacher. If you have been careful, all your work will be correct. Aim to have no errors. If you get 100%, or a perfect score, it means that you have no difficulty in this part of arithmetic that you need worry about if you are careful hereafter.

If you have made an error in any example, note carefully its number on the test. Then do this example over, and to make sure that you will not fail on that difficulty again, do all the other examples on that step. This extra practice will help to strengthen you where you were weakest.

9. Step-by-Step Test Drill — Addition of Fractions

	A	B	C	D	E
1.	$\frac{3}{10} + \frac{1}{10} + \frac{2}{10}$	$\frac{5}{12} + \frac{3}{12} + \frac{1}{12}$	$\frac{2}{9} + \frac{3}{9} + \frac{1}{9}$	$\frac{3}{8} + \frac{1}{8} + \frac{2}{8}$	$\frac{3}{15} + \frac{4}{15} + \frac{5}{15}$
2.	$\frac{7}{12} + \frac{3}{4} + \frac{2}{3}$	$\frac{3}{4} + \frac{1}{2} + \frac{6}{8}$	$\frac{2}{5} + \frac{1}{2} + \frac{1}{10}$	$\frac{2}{3} + \frac{3}{5} + \frac{11}{15}$	$\frac{2}{3} + \frac{1}{2} + \frac{5}{6}$
3.	$\frac{5}{8} + \frac{1}{2}$	$\frac{7}{10} + \frac{3}{5}$	$\frac{5}{8} + \frac{3}{4}$	$\frac{2}{3} + \frac{9}{12}$	$\frac{5}{6} + \frac{1}{3}$
4.	$\frac{5}{6} + \frac{2}{3} + \frac{1}{8}$	$\frac{2}{5} + \frac{1}{2} + \frac{5}{6}$	$\frac{1}{2} + \frac{3}{5} + \frac{7}{10}$	$\frac{3}{4} + \frac{1}{3} + \frac{2}{8}$	$\frac{2}{4} + \frac{3}{5} + \frac{1}{2}$
5.	$\begin{array}{r} 8\frac{4}{15} \\ 2\frac{3}{15} \\ 3\frac{2}{15} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{1}{6} \\ 3\frac{2}{6} \\ 4\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{5}{18} \\ 6\frac{7}{18} \\ 2\frac{3}{18} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{5}{12} \\ 7\frac{2}{12} \\ 3\frac{3}{12} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{3}{10} \\ 4\frac{2}{10} \\ 6\frac{1}{10} \\ \hline \end{array}$
6.	$\begin{array}{r} 6\frac{1}{4} \\ 12\frac{2}{4} \\ 7\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{3}{8} \\ 6\frac{2}{8} \\ 5\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 16\frac{8}{10} \\ 9\frac{5}{10} \\ 3\frac{7}{10} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{4}{12} \\ 6\frac{3}{12} \\ 9\frac{5}{12} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{3}{6} \\ 6\frac{5}{6} \\ 4\frac{4}{6} \\ \hline \end{array}$
7.	$\begin{array}{r} 12\frac{2}{5} \\ 6\frac{1}{2} \\ 8\frac{2}{10} \\ \hline \end{array}$	$\begin{array}{r} 16\frac{1}{5} \\ 3\frac{4}{15} \\ 8\frac{2}{3} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{5}{8} \\ 17\frac{1}{4} \\ 9\frac{3}{16} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{2}{3} \\ 7\frac{1}{6} \\ 16\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{1}{2} \\ 2\frac{1}{3} \\ 16\frac{5}{9} \\ \hline \end{array}$
8.	$\begin{array}{r} 15\frac{5}{12} \\ 8\frac{1}{6} \\ 7\frac{2}{3} \\ 1\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 12\frac{3}{4} \\ 6 \\ 18\frac{2}{3} \\ 7\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{2}{5} \\ 7\frac{1}{2} \\ 18\frac{7}{10} \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 13\frac{1}{2} \\ 4\frac{5}{6} \\ 8 \\ 6\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{3}{8} \\ 7\frac{1}{2} \\ 6\frac{3}{4} \\ 8\frac{7}{8} \\ \hline \end{array}$
9.	$\begin{array}{r} 15\frac{1}{4} \\ 16\frac{3}{5} \\ 7\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{1}{3} \\ 15\frac{1}{2} \\ 7\frac{3}{5} \\ \hline \end{array}$	$\begin{array}{r} 18\frac{1}{2} \\ 6\frac{2}{7} \\ 15\frac{1}{4} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{5}{9} \\ 18\frac{1}{3} \\ 2\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{3}{8} \\ 6\frac{5}{12} \\ 17\frac{2}{3} \\ \hline \end{array}$
10.	$\begin{array}{r} 26\frac{1}{3} \\ 15\frac{4}{5} \\ 4\frac{1}{6} \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 16\frac{7}{8} \\ 9 \\ 15\frac{1}{6} \\ 6\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{1}{2} \\ 9\frac{5}{6} \\ 7\frac{2}{5} \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 6\frac{3}{8} \\ 18\frac{1}{2} \\ 5\frac{1}{4} \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 6\frac{1}{6} \\ 9\frac{3}{4} \\ 5\frac{5}{9} \\ 6\frac{1}{12} \\ \hline \end{array}$

10. Subtraction of Fractions

A.	B.	C.
$\begin{array}{r} 60 \\ 7\frac{1}{2} \\ \hline 52\frac{1}{2} \end{array}$	$\begin{array}{r|l} 36\frac{7}{8} & \frac{7}{8} \\ 25\frac{1}{4} & \frac{2}{8} \\ \hline 11\frac{5}{8} & \frac{5}{8} \end{array}$	$\begin{array}{r|l} 16\frac{1}{6} & 21 (3 + 18) \\ 5\frac{5}{18} & 5 \\ \hline 10\frac{8}{9} & \frac{16}{18} = \frac{8}{9} \end{array}$

Remember:

1. Only like fractions may be subtracted.
2. Subtract the numerators only.
3. Reduce the fraction in the answer to lowest terms.
4. Check your work by adding the remainder and the subtrahend. The result should equal the minuend.

Without pencil. Write the answers only.

(a)	(b)	(c)	(d)
1. $\frac{1}{2} - \frac{1}{6}$	$\frac{5}{7} - \frac{5}{7}$	$1 - \frac{1}{6}$	$6 - 5\frac{4}{5}$
2. $8 - 4\frac{2}{3}$	$\frac{3}{4} - \frac{1}{12}$	$6\frac{5}{8} - 6\frac{1}{8}$	$12\frac{2}{3} - 12$
3. $9\frac{5}{6} - 9\frac{1}{6}$	$7\frac{1}{4} - 2$	$7\frac{3}{4} - \frac{3}{4}$	$\frac{12}{10} - \frac{4}{10}$
4. $9\frac{7}{8} - \frac{7}{8}$	$9 - 8\frac{7}{8}$	$8\frac{7}{10} - 2\frac{7}{10}$	$8\frac{9}{10} - \frac{1}{10}$
5. $\frac{3}{4} - \frac{1}{2}$	$7 - 3\frac{11}{12}$	$\frac{9}{8} - \frac{7}{8}$	$8\frac{1}{2} - 3$
6. $1 - \frac{1}{5}$	$9\frac{3}{4} - 9$	$9\frac{7}{8} - \frac{3}{8}$	$6\frac{7}{8} - 4\frac{7}{8}$
7. $1\frac{1}{3} - \frac{2}{3}$	$1\frac{1}{4} - \frac{3}{4}$	$1\frac{1}{5} - \frac{4}{5}$	$1\frac{1}{6} - \frac{5}{6}$
8. $\frac{5}{8} - \frac{5}{8}$	$1 - \frac{4}{5}$	$\frac{8}{9} - \frac{8}{9}$	$1 - \frac{5}{8}$
9. $\frac{7}{6} - \frac{1}{2}$	$8\frac{1}{2} - \frac{2}{3}$	$8\frac{1}{2} - 8\frac{1}{2}$	$1\frac{5}{6} - 1\frac{1}{6}$
10. $3\frac{1}{4} - 2\frac{5}{8}$	$1\frac{1}{2} - \frac{2}{3}$	$1\frac{5}{8} - 1\frac{1}{8}$	$4\frac{3}{5} - 2\frac{1}{5}$

11. Practice in Subtraction of Fractions

How many examples can you do correctly in 10 minutes? First, begin with Column A, and when you have finished, go on to Column B. Then try again, beginning with Column B and continuing to Column C. Each column has eighteen examples. Don't forget to turn the page.

Use pencil if needed.

A	B	C	D
1. $8\frac{1}{8} - \frac{1}{3}$	$6\frac{1\frac{1}{2}}{12} - \frac{2}{3}$	$8\frac{9}{10} - \frac{1}{2}$	$6\frac{1}{10} - 5\frac{3}{5}$
2. $5\frac{1}{6} - \frac{2}{3}$	$9\frac{1}{2} - \frac{3}{5}$	$9\frac{1}{3} - 8\frac{5}{6}$	$5\frac{8}{15} - \frac{1}{3}$
3. $12\frac{7}{8} - \frac{2}{8}$	$7\frac{1}{10} - 6\frac{1}{5}$	$7\frac{1}{4} - \frac{2}{3}$	$7\frac{1}{8} - 6\frac{5}{6}$
4. $10\frac{5}{12} - 9\frac{3}{4}$	$9\frac{1}{4} - 8\frac{3}{5}$	$4\frac{1}{5} - 3\frac{5}{6}$	$8\frac{1}{3} - \frac{1}{2}$
5. $6\frac{1}{4} - 3\frac{2}{3}$	$1\frac{1}{9} - \frac{1}{2}$	$3\frac{1}{8} - \frac{1}{3}$	$7\frac{1}{6} - 6\frac{4}{6}$
6. $1\frac{1}{12} - \frac{2}{3}$	$8\frac{1}{3} - 6\frac{5}{8}$	$1\frac{1}{4} - \frac{3}{5}$	$5\frac{1}{5} - \frac{1}{4}$
7. $7\frac{1}{5} - \frac{2}{3}$	$9\frac{1}{6} - \frac{3}{5}$	$6\frac{1}{5} - 2\frac{5}{6}$	$1\frac{1}{8} - \frac{2}{3}$
8. $8\frac{5}{8} - 7\frac{6}{8}$	$6\frac{2}{5} - 5\frac{4}{5}$	$8\frac{1}{3} - 7\frac{2}{3}$	$8\frac{1}{4} - 7\frac{4}{5}$
9. $3\frac{5}{9} - \frac{1}{2}$	$1\frac{1}{8} - \frac{1}{2}$	$8\frac{5}{12} - \frac{1}{6}$	$8\frac{1}{2} - \frac{3}{10}$
10. $9\frac{2}{3} - 2\frac{1}{6}$	$7\frac{7}{8} - \frac{1}{3}$	$7\frac{2}{3} - 3\frac{1}{3}$	$6\frac{7}{10} - \frac{1}{2}$
11. $4\frac{8}{15} - \frac{1}{3}$	$6\frac{3}{4} - 3\frac{1}{12}$	$6\frac{4}{5} - \frac{1}{3}$	$6\frac{1}{2} - \frac{1}{4}$
12. $8\frac{3}{4} - 6\frac{1}{4}$	$6\frac{1\frac{1}{2}}{12} - 3\frac{2}{12}$	$9\frac{7}{10} - 5\frac{2}{10}$	$1\frac{1}{4} - \frac{1}{3}$
13. $9\frac{3}{4} - \frac{1}{8}$	$1\frac{1}{4} - \frac{3}{4}$	$1\frac{1}{12} - \frac{7}{12}$	$9\frac{4}{5} - \frac{7}{10}$
14. $1\frac{1}{6} - \frac{5}{6}$	$10\frac{2}{3} - \frac{3}{6}$	$1\frac{7}{8} - 1\frac{3}{4}$	$1\frac{9}{10} - 1\frac{4}{5}$
15. $1\frac{5}{6} - 1\frac{2}{3}$	$8\frac{5}{8} - 2\frac{1}{4}$	$4\frac{9}{10} - 1\frac{1}{10}$	$9\frac{5}{6} - 4\frac{2}{3}$
16. $8\frac{2}{3} - 2\frac{5}{6}$	$5\frac{3}{8} - 1\frac{3}{4}$	$1\frac{5}{6} - 1\frac{1}{3}$	$6\frac{4}{5} - \frac{1}{5}$

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
17.	$45\frac{7}{8}$ <u>$5\frac{2}{3}$</u>	$67\frac{2}{5}$ <u>$\frac{3}{4}$</u>	$45\frac{1}{5}$ <u>$5\frac{2}{3}$</u>	$58\frac{2}{3}$ <u>$5\frac{2}{5}$</u>
18.	$18\frac{3}{5}$ <u>$6\frac{1}{2}$</u>	$12\frac{1}{6}$ <u>$7\frac{3}{4}$</u>	$56\frac{5}{12}$ <u>$2\frac{7}{8}$</u>	$28\frac{3}{5}$ <u>$7\frac{1}{3}$</u>

12. Step-by-Step Test Drill — Subtraction of Fractions

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1.	$\frac{8}{9} - \frac{2}{9}$	$\frac{11}{12} - \frac{3}{12}$	$\frac{7}{8} - \frac{3}{8}$	$\frac{9}{10} - \frac{5}{10}$	$\frac{7}{15} - \frac{4}{15}$
2.	$\frac{3}{4} - \frac{5}{8}$	$\frac{1}{3} - \frac{1}{6}$	$\frac{9}{10} - \frac{1}{5}$	$\frac{7}{20} - \frac{1}{5}$	$\frac{11}{12} - \frac{1}{3}$
3.	$\frac{9}{20} - \frac{1}{5}$	$\frac{9}{24} - \frac{1}{8}$	$\frac{7}{12} - \frac{1}{4}$	$\frac{11}{18} - \frac{1}{9}$	$\frac{7}{10} - \frac{1}{2}$
4.	$\frac{2}{3} - \frac{1}{5}$	$\frac{1}{2} - \frac{1}{9}$	$\frac{5}{8} - \frac{1}{3}$	$\frac{4}{5} - \frac{3}{4}$	$\frac{1}{2} - \frac{1}{5}$
5.	$\frac{9}{15} - \frac{1}{2}$	$\frac{4}{5} - \frac{2}{4}$	$\frac{4}{8} - \frac{1}{3}$	$\frac{6}{9} - \frac{1}{2}$	$\frac{2}{3} - \frac{2}{8}$
6.	$\frac{5}{6} - \frac{1}{4}$	$\frac{8}{9} - \frac{1}{6}$	$\frac{5}{6} - \frac{3}{8}$	$\frac{5}{8} - \frac{3}{10}$	$\frac{3}{4} - \frac{3}{10}$
7.	$6\frac{7}{8} - 2\frac{3}{8}$	$4\frac{9}{10} - 1\frac{1}{10}$	$8\frac{5}{6} - 3\frac{1}{6}$	$12\frac{3}{6} - \frac{1}{6}$	$18\frac{5}{8} - 6\frac{3}{8}$
8.	$8\frac{5}{8} - 2\frac{1}{4}$	$9\frac{5}{6} - 4\frac{2}{3}$	$8\frac{11}{12} - 6\frac{1}{3}$	$9\frac{3}{4} - 6\frac{5}{8}$	$7\frac{3}{5} - 4\frac{3}{10}$
9.	$27 - 8\frac{5}{8}$	$52 - 3\frac{5}{9}$	$46 - 9\frac{4}{5}$	$83 - 7\frac{2}{3}$	$46 - 5\frac{4}{5}$
10.	$36\frac{1}{10} - 14\frac{7}{10}$	$85\frac{1}{6} - 14\frac{5}{6}$	$47\frac{1}{8} - 26\frac{5}{8}$	$79\frac{5}{12} - 43\frac{11}{12}$	$63\frac{1}{8} - 21\frac{7}{8}$
11.	$16\frac{1}{4} - \frac{5}{8}$	$37\frac{1}{3} - \frac{3}{6}$	$42\frac{2}{5} - \frac{7}{10}$	$39\frac{1}{4} - \frac{7}{8}$	$23\frac{1}{4} - \frac{8}{12}$
12.	$15\frac{1}{6} - 11\frac{2}{3}$	$78\frac{3}{4} - 42\frac{11}{12}$	$59\frac{1}{5} - 27\frac{7}{10}$	$83\frac{1}{6} - 21\frac{5}{12}$	$36\frac{1}{8} - 14\frac{7}{24}$
13.	$1\frac{1}{3} - \frac{5}{6}$	$1\frac{1}{4} - \frac{4}{8}$	$1\frac{1}{3} - \frac{6}{9}$	$1\frac{1}{6} - \frac{1}{2}$	$1\frac{1}{10} - \frac{3}{10}$
14.	$82\frac{3}{5}$ <u>$27\frac{5}{6}$</u>	$42\frac{1}{8}$ <u>$20\frac{4}{5}$</u>	$24\frac{5}{6}$ <u>$16\frac{7}{8}$</u>	$33\frac{1}{4}$ <u>$27\frac{5}{9}$</u>	$78\frac{5}{12}$ <u>$16\frac{4}{9}$</u>

13. Multiplication of Fractions

A. $3 \times \frac{4}{5} = \frac{12}{5} = 2\frac{2}{5}$	B. $\frac{3}{5} \times \frac{3}{4} = \frac{9}{20}$
C. $2\frac{1}{3} \times 3\frac{6}{7} =$ $\begin{array}{r} 1 \quad 9 \\ 7 \quad \cancel{27} \\ \hline \frac{7}{3} \times \frac{7}{7} = 9 \\ 1 \quad 1 \end{array}$	D. $28\frac{2}{3}$ $\begin{array}{r} 8 \\ \hline 5\frac{1}{3} \quad (\frac{2}{3} \times 8 = \frac{16}{3} = 5\frac{1}{3}) \\ 224 \\ \hline 229\frac{1}{3} \end{array}$

Remember:

- 1. *Change mixed numbers to improper fractions.*
- 2. *Cancel whenever possible.*
- 3. *Multiply the numerators together for a new numerator and the denominators for a new denominator.*

Without pencil.

(a)	(b)	(c)	(d)
1. $\frac{1}{5}$ of 10	$\frac{3}{8}$ of 1	$\frac{1}{4} \times 4$	$\frac{2}{5}$ of 1
2. $\frac{2}{8} \times 3$	$3\frac{2}{3} \times 1$	$5\frac{1}{2} \times 1$	$4 \times \frac{1}{4}$
3. $\frac{1}{8} \times 8$	$\frac{3}{9} \times 2$	$\frac{1}{7} \times 7$	$\frac{1}{7} \times \frac{1}{3}$
4. $\frac{1}{3} \times \frac{1}{3}$	$\frac{1}{3}$ of 9	$\frac{1}{2} \times \frac{1}{2}$	$\frac{3}{4}$ of 1
5. $6\frac{1}{2} \times 1$	$\frac{1}{8}$ of $\frac{1}{5}$	$8 \times \frac{1}{8}$	$6 \times \frac{1}{6}$

Use pencil if needed.

- 6. Nellie needs $\frac{5}{8}$ yd. of ribbon for each Christmas gift that she is making. For 6 gifts she will need _____ yards.
- 7. Fred buys 60 papers each day at $2\frac{1}{2}\text{¢}$ each. What does he pay for them?

14. Practice in Multiplication of Fractions

How many examples can you do correctly in 10 minutes? First, begin with Column A, and when you have finished, go on to Column B. Then, try again, beginning with Column B and continuing to Column C.

Use pencil if needed.

A	B	C	D
1. $5 \times \frac{3}{25}$	$18 \times \frac{2}{5}$	$\frac{4}{15} \times 18$	$3 \times \frac{2}{7}$
2. $\frac{3}{4} \times 6$	$21 \times \frac{5}{6}$	$15 \times \frac{4}{9}$	$\frac{5}{8} \times 12$
3. $27 \times \frac{5}{6}$	$\frac{3}{5} \times 25$	$\frac{4}{7} \times 35$	$\frac{8}{9} \times 36$
4. $42 \times \frac{6}{7}$	$36 \times \frac{5}{12}$	$28 \times \frac{4}{7}$	$1\frac{3}{4} \times 7$
5. $\frac{1}{2} \times \frac{4}{7}$	$\frac{1}{4} \times \frac{8}{11}$	$\frac{1}{3} \times \frac{9}{10}$	$\frac{1}{5} \times \frac{15}{16}$
6. $\frac{8}{9} \times \frac{3}{4}$	$\frac{12}{15} \times \frac{5}{6}$	$\frac{15}{21} \times \frac{3}{5}$	$\frac{20}{21} \times \frac{3}{5}$
7. $\frac{9}{10} \times \frac{5}{9}$	$\frac{8}{15} \times \frac{5}{8}$	$\frac{9}{20} \times \frac{4}{9}$	$\frac{11}{16} \times \frac{4}{11}$
8. $\frac{18}{25} \times \frac{15}{24}$	$\frac{24}{25} \times \frac{20}{28}$	$\frac{18}{40} \times \frac{32}{45}$	$\frac{16}{27} \times \frac{18}{20}$
9. $\frac{3}{5} \times 1\frac{1}{2}$	$\frac{3}{4} \times 1\frac{1}{4}$	$\frac{5}{8} \times 1\frac{1}{6}$	$\frac{3}{7} \times 1\frac{1}{4}$
10. $\frac{1}{6} \times 4\frac{1}{2}$	$\frac{1}{15} \times 3\frac{1}{3}$	$\frac{1}{8} \times 1\frac{2}{5}$	$\frac{1}{6} \times 2\frac{1}{4}$
11. $\frac{3}{7} \times 4\frac{2}{3}$	$\frac{2}{5} \times 7\frac{1}{2}$	$\frac{4}{9} \times 6\frac{3}{4}$	$\frac{3}{7} \times 4\frac{2}{3}$
12. $\frac{4}{5} \times 6\frac{1}{2}$	$5\frac{1}{2} \times 6\frac{2}{3}$	$2\frac{5}{8} \times 3\frac{1}{7}$	$4\frac{2}{5} \times 3\frac{1}{2}$

13. A butcher's price list was as follows:

Lamb, 46¢ per pound
Ham, 32¢ per pound
Steak, 54¢ per pound

Chicken, 42¢ per pound
Turkey, 56¢ per pound
Roast Beef (Prime), 44¢ per pound

Find the cost of the following:

- (a) A leg of lamb weighing $6\frac{1}{2}$ lb. (d) Two chickens weighing $4\frac{1}{2}$ lb. each
 (b) A roast of beef weighing $8\frac{3}{4}$ lb. (e) A turkey weighing $14\frac{1}{4}$ lb.
 (c) One ham weighing $8\frac{5}{8}$ lb. (f) $3\frac{3}{8}$ lb. of steak

15. Step-by-Step Test Drill — Multiplication of Fractions

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1.	$\frac{1}{9}$ of 3	$\frac{1}{8}$ of 4	$\frac{1}{12}$ of 3	$\frac{1}{15}$ of 5	$\frac{1}{12}$ of 2
2.	$12 \times \frac{3}{4}$	$15 \times \frac{2}{3}$	$16 \times \frac{7}{8}$	$20 \times \frac{2}{5}$	$16 \times \frac{3}{4}$
3.	$\frac{2}{9}$ of 4	$\frac{1}{12}$ of 5	$\frac{3}{7}$ of 2	$\frac{1}{8}$ of 3	$\frac{2}{11}$ of 5
4.	$\frac{3}{4} \times 11$	$\frac{5}{8} \times 15$	$\frac{3}{10} \times 9$	$15 \times \frac{2}{7}$	$16 \times \frac{2}{3}$
5.	$6 \times 1\frac{1}{5}$	$3\frac{1}{2} \times 7$	$4 \times 1\frac{1}{3}$	$1\frac{2}{3} \times 5$	$6 \times 1\frac{3}{5}$
6.	$2\frac{1}{8} \times 4$	$3 \times 1\frac{1}{6}$	$2\frac{1}{15} \times 5$	$6 \times 3\frac{1}{12}$	$2\frac{1}{6} \times 3$
7.	$3\frac{1}{2} \times 8$	$5\frac{1}{3} \times 15$	$18 \times 2\frac{1}{6}$	$2\frac{1}{8} \times 24$	$15 \times 2\frac{1}{5}$
8.	$16 \times 1\frac{1}{12}$	$24 \times 2\frac{1}{6}$	$3\frac{1}{8} \times 12$	$20 \times 1\frac{1}{5}$	$2\frac{5}{12} \times 18$
9.	$\frac{3}{10} \times \frac{5}{6}$	$\frac{5}{8} \times \frac{4}{15}$	$\frac{3}{16} \times \frac{4}{9}$	$\frac{9}{10} \times \frac{5}{18}$	$\frac{5}{16} \times \frac{4}{15}$
10.	$\frac{3}{4} \times \frac{4}{3}$	$\frac{5}{7} \times \frac{7}{5}$	$\frac{5}{6} \times \frac{6}{5}$	$\frac{7}{8} \times \frac{8}{7}$	$\frac{5}{9} \times \frac{9}{5}$
11.	$\frac{2}{3} \times 6\frac{1}{5}$	$3\frac{1}{6} \times \frac{7}{8}$	$\frac{3}{5} \times 4\frac{1}{8}$	$3\frac{2}{3} \times \frac{7}{10}$	$\frac{5}{8} \times 3\frac{2}{3}$
12.	$2\frac{1}{7} \times \frac{3}{5}$	$\frac{2}{3} \times 3\frac{1}{5}$	$2\frac{1}{3} \times \frac{9}{10}$	$\frac{5}{6} \times 3\frac{3}{7}$	$3\frac{1}{12} \times \frac{24}{25}$
13.	$3\frac{3}{4} \times 2\frac{2}{3}$	$5\frac{1}{5} \times 7\frac{1}{2}$	$2\frac{1}{4} \times 2\frac{2}{3}$	$1\frac{3}{7} \times 4\frac{1}{5}$	$3\frac{1}{5} \times 3\frac{3}{4}$
14.	$560 \times 27\frac{3}{4}$	$926\frac{7}{8} \times 78$	$43\frac{5}{9} \times 436$	$276 \times 247\frac{9}{10}$	$58 \times 560\frac{3}{5}$
15.	$\frac{3}{4} \times 2\frac{2}{3} \times 6$	$\frac{5}{8} \times 4 \times 3\frac{2}{5}$	$6\frac{1}{2} \times \frac{4}{5} \times 12$	$8\frac{5}{6} \times 16 \times \frac{7}{10}$	$2 \times \frac{3}{4} \times 4\frac{1}{2}$

16. Division of Fractions

A. $\frac{5}{8} \div 2 = \frac{5}{8} \times \frac{1}{2} = \frac{5}{16}$	B. $\frac{8}{9} \div \frac{2}{3} = \frac{\overset{4}{\cancel{8}}}{\underset{3}{9}} \times \frac{\overset{1}{\cancel{3}}}{\underset{1}{2}} = \frac{4}{3} = 1\frac{1}{3}$
C. $7 \div 2\frac{1}{3} = 7 \times \frac{\overset{1}{7}}{\underset{1}{\cancel{3}}} = \frac{3}{1} = 3$	D. $1\frac{2}{3} \div 6\frac{2}{3} = \frac{\overset{1}{\cancel{5}}}{\underset{1}{3}} \times \frac{\overset{1}{\cancel{3}}}{\underset{4}{\cancel{20}}} = \frac{1}{4}$

Remember:

1. The divisor follows the division sign.
2. Change mixed numbers to improper fractions.
3. Invert the divisor and multiply.
4. Cancel whenever possible.

Invert the following fractions:

1. $\frac{5}{8}$ $\frac{3}{4}$ $\frac{2}{7}$ $\frac{5}{9}$ $\frac{8}{11}$ $\frac{2}{3}$ $\frac{4}{5}$ $\frac{5}{9}$ $\frac{9}{10}$ $\frac{4}{9}$
2. $\frac{7}{3}$ $\frac{5}{2}$ $\frac{6}{5}$ $\frac{8}{7}$ $\frac{15}{4}$ $\frac{16}{3}$ $\frac{9}{2}$ $\frac{11}{4}$ $\frac{15}{8}$ $\frac{7}{2}$
3. $\frac{1}{6}$ $\frac{1}{7}$ $\frac{1}{8}$ $\frac{1}{7}$ $\frac{1}{4}$ $\frac{1}{9}$ $\frac{1}{12}$ $\frac{1}{15}$ $\frac{1}{3}$ $\frac{1}{2}$

Write as a fraction and invert:

4. $3\frac{1}{2}$ $4\frac{3}{4}$ $5\frac{1}{6}$ $8\frac{2}{3}$ $4\frac{5}{6}$ $6\frac{1}{2}$ $5\frac{3}{4}$ $7\frac{7}{8}$ $12\frac{1}{2}$ $6\frac{5}{8}$

An inverted fraction is called the *reciprocal* of the fraction.

$\frac{1}{4}$ is the reciprocal of 4
4 is the reciprocal of $\frac{1}{4}$

$\frac{3}{8}$ is the reciprocal of $\frac{8}{3}$
 $\frac{8}{3}$ is the reciprocal of $\frac{3}{8}$

Write the reciprocal of each of the following:

5.	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{10}$	$\frac{1}{11}$
6.	4	6	7	9	3	2	12	25	16	18
7.	$\frac{3}{7}$	$\frac{4}{5}$	$\frac{2}{5}$	$\frac{6}{7}$	$\frac{11}{12}$	$\frac{16}{17}$	$\frac{19}{24}$	$\frac{18}{27}$	$\frac{16}{26}$	$\frac{21}{28}$
8.	$\frac{18}{5}$	$\frac{13}{6}$	$\frac{27}{4}$	$\frac{15}{2}$	$\frac{19}{8}$	$\frac{6}{3}$	$\frac{17}{5}$	$\frac{24}{3}$	$\frac{16}{12}$	$\frac{5}{2}$

17. Practice in Division of Fractions

How many examples can you do correctly in 10 minutes? First, begin with Column A, and when you have finished, go on to Column B. Then try again, beginning with Column B and continuing to Column C.

A	B	C	D
1. $\frac{1}{3} \div 3$	$\frac{1}{4} \div 5$	$\frac{1}{6} \div 3$	$\frac{1}{8} \div 2$
2. $\frac{3}{8} \div 3$	$\frac{6}{7} \div 2$	$\frac{8}{9} \div 4$	$\frac{8}{15} \div 2$
3. $\frac{2}{5} \div \frac{3}{4}$	$\frac{2}{3} \div \frac{3}{4}$	$\frac{3}{7} \div \frac{1}{2}$	$4 \div \frac{1}{3}$
4. $2 \div \frac{1}{5}$	$8 \div \frac{1}{3}$	$5 \div \frac{2}{3}$	$7 \div \frac{4}{5}$
5. $9 \div \frac{2}{7}$	$4 \div \frac{4}{7}$	$7 \div \frac{7}{8}$	$9 \div \frac{9}{10}$
6. $12 \div \frac{15}{16}$	$15 \div \frac{9}{10}$	$9 \div \frac{12}{15}$	$\frac{5}{7} \div \frac{1}{5}$
7. $\frac{6}{8} \div \frac{1}{3}$	$\frac{3}{4} \div \frac{1}{7}$	$\frac{1}{3} \div \frac{7}{12}$	$\frac{1}{4} \div \frac{7}{8}$
8. $\frac{1}{5} \div \frac{9}{10}$	$\frac{5}{9} \div \frac{5}{6}$	$\frac{5}{14} \div \frac{5}{7}$	$\frac{8}{9} \div \frac{8}{3}$
9. $\frac{6}{7} \div 8$	$\frac{8}{9} \div 10$	$\frac{9}{10} \div 12$	$\frac{1}{3} \div \frac{1}{2}$
10. $\frac{1}{5} \div \frac{1}{4}$	$\frac{1}{6} \div \frac{1}{5}$	$\frac{1}{3} \div \frac{1}{5}$	$\frac{1}{2} \div \frac{1}{7}$
11. $\frac{1}{4} \div \frac{1}{5}$	$\frac{2}{3} \div \frac{4}{5}$	$\frac{4}{5} \div \frac{8}{9}$	$\frac{3}{7} \div \frac{12}{15}$
12. $\frac{1}{4} \div \frac{1}{6}$	$\frac{1}{6} \div \frac{1}{8}$	$\frac{1}{10} \div \frac{1}{15}$	$\frac{1}{4} \div \frac{1}{16}$
13. $\frac{1}{5} \div \frac{1}{20}$	$\frac{1}{8} \div \frac{1}{24}$	$5\frac{1}{2} \div 4$	$6\frac{1}{3} \div 4$
14. $3\frac{1}{3} \div 2$	$7\frac{1}{2} \div 5$	$6\frac{2}{3} \div 10$	$3\frac{3}{4} \div 5$

18. Step-by-Step Test Drill — Division of Fractions

	A	B	C	D	E
1.	$\frac{6}{7} \div 3$	$\frac{4}{5} \div 2$	$\frac{8}{9} \div 4$	$\frac{8}{15} \div 2$	$\frac{7}{8} \div 7$
2.	$\frac{3}{4} \div 2$	$\frac{2}{3} \div 3$	$\frac{3}{8} \div 5$	$\frac{4}{9} \div 5$	$\frac{11}{12} \div 2$
3.	$\frac{4}{5} \div 8$	$\frac{3}{4} \div 9$	$\frac{6}{7} \div 12$	$\frac{5}{8} \div 15$	$\frac{2}{3} \div 6$
4.	$5 \div \frac{10}{11}$	$6 \div \frac{8}{25}$	$7 \div \frac{4}{15}$	$8 \div \frac{4}{25}$	$4 \div \frac{20}{21}$
5.	$10 \div \frac{5}{6}$	$12 \div \frac{4}{5}$	$30 \div \frac{5}{6}$	$24 \div \frac{8}{9}$	$9 \div \frac{3}{4}$
6.	$\frac{8}{9} \div \frac{2}{3}$	$\frac{9}{10} \div \frac{3}{5}$	$\frac{7}{8} \div \frac{4}{24}$	$\frac{9}{20} \div \frac{3}{15}$	$\frac{21}{25} \div \frac{7}{10}$
7.	$\frac{3}{4} \div \frac{3}{8}$	$\frac{4}{5} \div \frac{4}{15}$	$\frac{5}{6} \div \frac{5}{12}$	$\frac{8}{9} \div \frac{8}{27}$	$\frac{9}{10} \div \frac{9}{20}$
8.	$\frac{1}{4} \div \frac{1}{4}$	$\frac{1}{8} \div \frac{1}{8}$	$\frac{1}{6} \div \frac{1}{6}$	$\frac{1}{7} \div \frac{1}{7}$	$\frac{1}{12} \div \frac{1}{12}$
9.	$4\frac{1}{2} \div 5$	$2\frac{1}{3} \div 4$	$3\frac{1}{4} \div 5$	$3\frac{2}{3} \div 6$	$2\frac{2}{3} \div 7$
10.	$13\frac{1}{2} \div 9$	$12\frac{1}{2} \div 5$	$10\frac{1}{2} \div 7$	$22\frac{1}{2} \div 5$	$7\frac{1}{5} \div 12$
11.	$1 \div 1\frac{3}{4}$	$1 \div 5\frac{1}{2}$	$1 \div 3\frac{2}{5}$	$1 \div 1\frac{4}{5}$	$1 \div 8\frac{1}{2}$
12.	$1\frac{2}{3} \div \frac{1}{6}$	$4\frac{1}{2} \div \frac{1}{12}$	$3\frac{2}{3} \div \frac{1}{9}$	$7\frac{1}{5} \div \frac{1}{10}$	$5\frac{3}{4} \div \frac{1}{20}$
13.	$2\frac{4}{5} \div \frac{4}{5}$	$1\frac{7}{8} \div \frac{6}{8}$	$3\frac{4}{10} \div \frac{8}{10}$	$4\frac{1}{8} \div \frac{6}{8}$	$3\frac{1}{5} \div \frac{6}{5}$
14.	$10 \div 3\frac{3}{4}$	$25 \div 4\frac{2}{7}$	$14 \div 2\frac{5}{8}$	$8 \div 4\frac{2}{3}$	$15 \div 12\frac{1}{2}$
15.	$\frac{8}{9} \div 1\frac{1}{7}$	$\frac{7}{8} \div 1\frac{2}{5}$	$\frac{9}{11} \div 4\frac{1}{2}$	$\frac{7}{10} \div 2\frac{1}{3}$	$\frac{5}{11} \div 1\frac{1}{4}$
16.	$\frac{8}{9} \div 5\frac{1}{3}$	$\frac{5}{6} \div 3\frac{1}{3}$	$\frac{11}{15} \div 4\frac{2}{5}$	$\frac{17}{24} \div 5\frac{4}{6}$	$\frac{7}{25} \div 2\frac{4}{5}$
17.	$13\frac{1}{3} \div 1\frac{7}{9}$	$11\frac{2}{3} \div 2\frac{2}{6}$	$6\frac{1}{4} \div 4\frac{3}{8}$	$6\frac{1}{4} \div 1\frac{8}{12}$	$3\frac{3}{8} \div 1\frac{6}{24}$

19. Principles of Fractions Reviewed

1. *Multiplying or dividing both the numerator and the denominator of a fraction by the same number does not change the value of the fraction.*

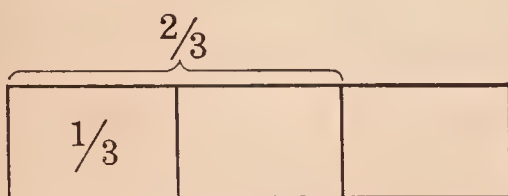
$$\frac{3 \times 3}{3 \times 4} = \frac{9}{12}$$

$$\frac{9}{12 \div 3} = \frac{3}{4}$$

$$\frac{3}{4} = \frac{9}{12}$$

Illustrate this principle with original examples.

2. *Multiplying the numerator of a fraction multiplies the fraction; multiplying the denominator of a fraction divides the fraction.*



$$\frac{2 \times 1}{3} = \frac{2}{3}$$

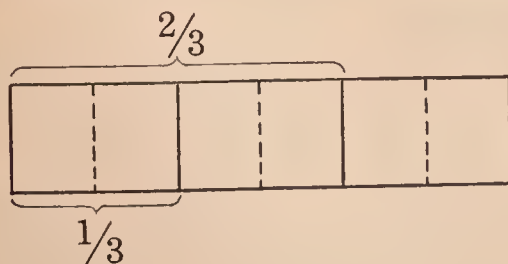
$$\frac{2}{3} = 2 \times \frac{1}{3}$$

$$\frac{1}{2 \times 3} = \frac{1}{6}$$

$$\frac{1}{6} = \frac{1}{3} \div 2 \text{ or } \frac{1}{2} \text{ of } \frac{1}{3}$$

Illustrate this principle with a diagram, using the fraction $\frac{1}{4}$ and the multiplier 2.

3. *Dividing the numerator of a fraction divides the fraction; dividing the denominator of a fraction multiplies the fraction.*



$$\frac{2 \div 2}{3} = \frac{1}{3}$$

$$\frac{1}{3} = \frac{1}{2} \text{ of } \frac{2}{3} \text{ or } \frac{2}{3} \div 2$$

$$\frac{1}{6 \div 2} = \frac{1}{3}$$

$$\frac{1}{3} = 2 \times \frac{1}{6}$$

Illustrate this principle with an original problem. Use a diagram.

1. What are the two ways in which a fraction may be multiplied?

2. Illustrate each with a diagram.

3. What are the two ways in which a fraction may be divided?

4. Illustrate each with a diagram.

5. Tell which principle was applied in the solution of each of the following examples:

$$(a) \frac{1\frac{5}{2}}{5} = \frac{3}{5}$$

$$(c) \frac{3}{4} \times 2 = \frac{6}{4} = 1\frac{1}{2}$$

$$(b) \frac{4}{7} = \frac{8}{14}$$

$$(d) \frac{2}{3} \div 3 = \frac{2}{3} \times \frac{1}{3} = \frac{2}{9}$$

6. Complete these statements:

(a) Multiplying the numerator of a fraction _____ the fraction.

(b) Dividing the numerator of a fraction _____ the fraction.

(c) Multiplying the _____ of a fraction divides the fraction.

(d) Dividing the _____ of a fraction divides the fraction.

(e) Multiplying or dividing both the numerator and the denominator of the fraction by the same number _____ change the value of the fraction.

(f) When we reduce a fraction to lowest terms, we _____ both terms of the fraction by the same number.

(g) When we reduce a fraction to higher terms, we _____ both terms of the fraction by the same number.

7. Show with a diagram that $\frac{3}{4} = \frac{6}{8} = \frac{1\frac{2}{2}}{1\frac{6}{6}}$.

8. Show with a diagram that $\frac{1}{3} = \frac{2}{6} = \frac{3}{9}$.

20. Problems with Fractions

1. Mr. Ward employed 5 men in his business. These men were paid at the rate of \$1.20 an hour, with time and a half for overtime. The regular working day is eight hours; on Saturday it is five hours. From the following card find (a) the amount due each man, and (b) the total amount of wages paid by Mr. Ward. (Change minutes to fractions of an hour.)

WORKMAN	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
A.....	7 hr. 30 min.	7 hr.	7 hr. 15 min.	7 hr. 10 min.	8 hr.	8 hr.
B.....	8 hr.	8 hr. 15 min.	8 hr. 40 min.	8 hr.	9 hr.	6 hr. 30 min.
C.....	6 hr.	6 hr. 45 min.	6 hr. 15 min.	6 hr. 50 min.	7 hr. 10 min.	
D.....	8 hr. 10 min.	8 hr. 20 min.	8 hr. 50 min.	8 hr. 45 min.		6 hr.
E.....	8 hr.	7 hr. 45 min.	7 hr. 20 min.	8 hr.	7 hr. 40 min.	5 hr. 45 min.

2. What must a dressmaker pay for each of the following supplies:

- | | |
|---|--|
| (a) $5\frac{1}{4}$ yd. calico @ \$.33 $\frac{1}{3}$
per yard | (f) 8 yd. sateen @ \$.87 $\frac{1}{2}$
per yard |
| (b) $6\frac{1}{4}$ yd. gingham @ \$.60
per yard | (g) 5 yd. ribbon @ \$.60
per yard |
| (c) 3 yd. organdie @ \$.75
per yard | (h) $3\frac{1}{2}$ yd. lining @ \$.75
per yard |
| (d) $3\frac{3}{4}$ yd. percale @ \$.40
per yard | (i) $7\frac{1}{2}$ yd. gingham @ \$.66 $\frac{2}{3}$
per yard |
| (e) 16 yd. cotton voile @
\$.62 $\frac{1}{2}$ per yard | (j) 12 yd. silk @ \$.25 per
yard |

3. Mary made cookies to sell at a school fair. She made them from the recipes on page 24, using 4 times the quantity called for in the recipe for molasses cookies and $2\frac{1}{2}$ times the quantity called for in the recipe for oatmeal cookies. Rewrite each recipe as Mary used it.

MOLASSES COOKIES

$\frac{1}{2}$ cup shortening	$\frac{1}{4}$ teaspoon soda
$\frac{1}{2}$ cup brown sugar	$\frac{1}{2}$ teaspoon salt
$\frac{3}{4}$ cup molasses	1 teaspoon baking powder
1 egg, beaten	$\frac{1}{2}$ teaspoon ginger
$\frac{1}{4}$ cup boiling water	$\frac{1}{2}$ teaspoon allspice
$3\frac{1}{2}$ cups pastry flour	$\frac{2}{3}$ cup raisins

OATMEAL COOKIES

1 cup shortening	2 cups graham flour
$\frac{1}{2}$ cup sugar	2 cups pastry flour
$\frac{3}{4}$ cup coffee	2 cups rolled oats
1 cup molasses	$\frac{1}{2}$ teaspoon soda
$\frac{2}{3}$ cup raisins	1 teaspoon baking powder
$\frac{1}{2}$ teaspoon cloves	1 teaspoon salt
1 teaspoon cinnamon	

4. Mr. Graham uses $1\frac{1}{2}$ T. of coal each month. At this rate, how long will 12 T. last him?

5. The postman delivered 4 packages of books to a school. The total weight was $12\frac{1}{2}$ lb. What was the average weight of each package?

6. The following are the records made by the same pupils at different times. Find the average record of each pupil.

BROAD JUMP

	<i>Fred Allen</i>	<i>James Lucas</i>
1st trial	$6\frac{1}{3}$ ft.	$6\frac{3}{4}$ ft.
2nd trial	$6\frac{5}{6}$ ft.	7 ft.
3rd trial	$7\frac{1}{2}$ ft.	$7\frac{1}{4}$ ft.
4th trial	7 ft.	$7\frac{1}{2}$ ft.

50-YARD DASH

	<i>Ellen Hall</i>	<i>Mary Wilkins</i>
1st trial	$7\frac{1}{5}$ sec.	$8\frac{4}{5}$ sec.
2nd trial	8 sec.	$8\frac{2}{5}$ sec.
3rd trial	$7\frac{4}{5}$ sec.	$8\frac{3}{5}$ sec.
4th trial	$7\frac{2}{5}$ sec.	8 sec.

21. Selling Goods

Mr. Price works at the silk counter in a large department store. After he sells material from a piece of goods, he enters on the ticket the amount of goods remaining on the piece. For example: One piece of silk measured 50 yd. After selling $5\frac{1}{2}$ yd., Mr. Price entered $44\frac{1}{2}$ yd. on the ticket. This showed that $44\frac{1}{2}$ yd. remained on the piece.

1. How much remained on each of the following pieces of silk after each sale and after the day's sales?

<i>Amount on Piece</i>	<i>Day's Sales</i>
(a) $46\frac{1}{2}$ yd.	8 yd., $3\frac{5}{8}$ yd., $9\frac{1}{4}$ yd., $6\frac{3}{4}$ yd.
(b) 18 yd.	4 yd., $6\frac{1}{2}$ yd., $2\frac{1}{4}$ yd.
(c) $25\frac{1}{4}$ yd.	$6\frac{2}{3}$ yd., $4\frac{1}{3}$ yd., $7\frac{1}{2}$ yd., 2 yd.
(d) $34\frac{7}{8}$ yd.	$5\frac{3}{4}$ yd., $6\frac{1}{4}$ yd., $16\frac{3}{8}$ yd., 5 yd.
(e) $26\frac{3}{8}$ yd.	$4\frac{1}{2}$ yd., 6 yd., $3\frac{3}{4}$ yd., $4\frac{3}{8}$ yd.

2. What amount must Mr. Price write on the sales check of each of the following customers:

- Mrs. A, who bought $4\frac{1}{2}$ yd. satin @ \$1.75 per yard.
 Mrs. B, who bought $4\frac{5}{8}$ yd. rayon @ \$.75 per yard.
 Mrs. C, who bought $6\frac{1}{2}$ yd. taffeta @ \$2.25 per yard.
 Miss D, who bought $3\frac{1}{4}$ yd. voile @ \$.50 per yard.
 Miss E, who bought $3\frac{3}{4}$ yd. chiffon @ \$2.25 per yard.

22. Addition

A.		B.	
	20,172		492.0974
	<u>6,248</u>		<u>36.2</u>
	926		427.
	7		.856
	53		27.205
	<u>12,938</u>		<u>.8364</u>
	20,172		492.0974

Remember:

- 1. Write the figures in the proper column.
- 2. When adding decimals, place decimal point under decimal point.
- 3. Check your answer. The sum of each column when you add up should equal the sum when you add down.

Without pencil.

(a)	(b)	(c)	(d)
1. 35 + 49	73 + 64	87 + 69	4.7 + 2.3
2. 68 + 23	64 + 91	58 + 87	3.8 + 2.2
3. 36 + 47	53 + 72	66 + 89	5.4 + 1.6
4. 42 + 29	93 + 65	57 + 78	6.3 + 4.7
5. 55 + 26	62 + 77	89 + 76	5.5 + 2.5

Rewrite in a column and add:

- 6. .62 + 45.6 + 346.25 + .275 + 12.4
- 7. 275.3 + .8642 + 347 + 25.275
- 8. 936.04 + 7.2456 + .82 + 76 + 6.245
- *9. .34632 + 9.5 + .875 + 293 + 4.68
- 10. 642.3 + 927.5 + .756 + 43.28 + .563

23. Harder Addition Combinations That Occur in Multiplication

TIME: 5 minutes. AIM: First time, perfect score; second time, perfect score in less than 5 minutes.

Write the answers only.

A	B	C	D
1. $27 + 8$	$18 + 7$	$63 + 7$	$27 + 4$
2. $49 + 4$	$24 + 9$	$45 + 8$	$14 + 6$
3. $14 + 7$	$32 + 5$	$10 + 6$	$49 + 5$
4. $48 + 5$	$27 + 9$	$25 + 8$	$15 + 6$
5. $25 + 9$	$42 + 5$	$42 + 7$	$36 + 9$
6. $10 + 3$	$10 + 2$	$15 + 8$	$10 + 5$
7. $28 + 5$	$18 + 9$	$27 + 6$	$35 + 7$
8. $20 + 6$	$16 + 8$	$36 + 7$	$28 + 6$
9. $15 + 7$	$36 + 8$	$16 + 9$	$48 + 9$
10. $20 + 6$	$56 + 7$	$14 + 9$	$49 + 6$
11. $12 + 5$	$45 + 7$	$64 + 9$	$25 + 6$
12. $27 + 5$	$20 + 5$	$24 + 6$	$40 + 4$
13. $30 + 8$	$49 + 7$	$35 + 6$	$24 + 7$
14. $64 + 7$	$35 + 8$	$30 + 6$	$48 + 6$
15. $45 + 6$	$56 + 9$	$54 + 6$	$45 + 9$
16. $15 + 9$	$18 + 5$	$49 + 6$	$27 + 2$
17. $25 + 7$	$54 + 7$	$20 + 4$	$16 + 7$
18. $49 + 8$	$40 + 3$	$32 + 7$	$20 + 1$
19. $12 + 7$	$18 + 6$	$28 + 9$	$64 + 6$
20. $56 + 8$	$48 + 7$	$28 + 7$	$54 + 9$

24. Step-by-Step Test Drill — Addition of Integers

The following examples contain the harder combinations in addition.

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1.	89 57 92 98 45 58 59 <u>87</u>	58 55 88 99 77 25 85 <u>53</u>	72 48 55 58 89 94 75 <u>58</u>	75 25 88 59 87 92 48 <u>89</u>	77 24 85 55 88 99 47 <u>89</u>
2.	77,989 87,978 67,586 87,747 71,575 <u>57,698</u>	437,697 568,662 459,956 629,479 689,778 <u>954,957</u>	98,090 58,705 96,744 89,527 61,875 <u>67,667</u>	67,699 75,659 68,729 96,744 76,735 <u>24,568</u>	69,946 77,874 68,874 53,485 53,964 <u>36,530</u>
3.	57,977 95,778 69,799 79,774 65,765 69,888 <u>86,310</u>	91,755 70,245 56,757 85,456 25,585 76,476 <u>34,658</u>	61,979 29,781 87,589 89,866 47,995 35,490 <u>98,828</u>	78,469 85,488 56,690 79,496 98,745 60,248 <u>62,999</u>	41,699 77,978 73,746 69,679 74,546 94,576 <u>98,779</u>

25. Step-by-Step Test Drill — Addition of Decimals

	A	B	C	D	E
1.	$.4 + .1 + .3$	$.3 + .1 + .5$	$.6 + .1 + .2$	$.2 + .3 + .2$	$.5 + .1 + .3$
2.	$.8 + .2 + .9$	$.6 + .5 + .7$	$.9 + .2 + .3$	$.9 + .8 + .9$	$.8 + .7 + .9$
3.	$.28 + .45$	$.48 + .27$	$.37 + .49$	$.35 + .28$	$.68 + .26$
4.	$.53 + .37$	$.74 + .16$	$.42 + .28$	$.61 + .29$	$.37 + .33$
5.	$.67 + .45$	$.38 + .54$	$.93 + .46$	$.39 + .76$	$.42 + .89$
6.	$.02 + .03 + .04$	$.01 + .06 + .02$	$.02 + .02 + .07$	$.04 + .01 + .03$	$.05 + .01 + .02$
7.	$.09 + .07$	$.06 + .08$	$.06 + .09$	$.05 + .07$	$.07 + .08$
8.	$.74 + .2$	$.32 + .5$	$.47 + .3$	$.26 + .4$	$.53 + .3$
9.	$32.4 + .64$	$.925 + 2.5$	$.37 + 2.45$	$6.7 + .275$	$34.7 + .98$
10.	$3 + 2.6 + .75$	$46 + .9 + 3.2$	$.175 + .2 + 8$	$36 + .64 + .2$	$.8 + .62 + 9$
11.	$\begin{array}{r} 645.6 \\ .297 \\ 38.37 \\ 428. \\ \hline \end{array}$	$\begin{array}{r} 836.45 \\ 9.2 \\ .836 \\ 75. \\ \hline \end{array}$	$\begin{array}{r} .642 \\ 928. \\ 3.9 \\ .38 \\ \hline \end{array}$	$\begin{array}{r} 32.8 \\ 6.975 \\ 438. \\ .29 \\ \hline \end{array}$	$\begin{array}{r} 63.95 \\ .384 \\ 286.5 \\ 92. \\ \hline \end{array}$
12.	$.25 + \frac{1}{4}$	$.6 + \frac{3}{8}$	$.14 + \frac{5}{8}$	$.6 + \frac{3}{4}$	$.4 + \frac{7}{8}$

26. Subtraction

A.			B.	
	5407	Check		64.2
	609			2.936
	<u>4798</u>	4798		<u>61.264</u>
		609		61.264
		<u>5407</u>		- 2.936
				<u>64.200</u>

Remember:

- 1. Write the figures in the proper column.
- 2. When subtracting decimals, place decimal point under decimal point.
- 3. Check your answer. The sum of the remainder and the subtrahend should equal the minuend.

Without pencil.

Find the difference between

- | (a) | (b) | (c) | (d) |
|--------------|-----------|------------|--------------|
| 1. 84 and 49 | 77 and 39 | 160 and 73 | .6 and .45 |
| 2. 78 and 83 | 29 and 85 | 75 and 130 | .36 and .7 |
| 3. 69 and 76 | 97 and 68 | 130 and 82 | .05 and .025 |
| 4. 15 and 94 | 37 and 95 | 35 and 110 | 1 and .85 |
- 5. What must be added to 72.5 to make 80?
 - 6. What is the difference between 50 and 26.925?
 - 7. How much less than 9000 is .009?
 - 8. How much more than .75 is 750?
 - 9. Subtract 2.625 from 8000.
 - 10. The minuend is 924.6. The subtrahend is 62.475. What is the remainder?
 - 11. ? + 638.25 = 2002
 - 12. 2020.5753 - ? = 64.8

27. Step-by-Step Test Drill — Subtraction

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1.	$\begin{array}{r} 15,357 \\ - 8,459 \\ \hline \end{array}$	$\begin{array}{r} 17,535 \\ - 8,549 \\ \hline \end{array}$	$\begin{array}{r} 17,535 \\ - 8,846 \\ \hline \end{array}$	$\begin{array}{r} 15,753 \\ - 5,885 \\ \hline \end{array}$	$\begin{array}{r} 15,375 \\ - 5,489 \\ \hline \end{array}$
2.	$\begin{array}{r} 14,634 \\ - 4,939 \\ \hline \end{array}$	$\begin{array}{r} 14,643 \\ - 4,984 \\ \hline \end{array}$	$\begin{array}{r} 14,364 \\ - 8,395 \\ \hline \end{array}$	$\begin{array}{r} 13,446 \\ - 3,850 \\ \hline \end{array}$	$\begin{array}{r} 14,643 \\ - 4,984 \\ \hline \end{array}$
3.	$\begin{array}{r} 17,579 \\ - 7,890 \\ \hline \end{array}$	$\begin{array}{r} 15,797 \\ - 8,799 \\ \hline \end{array}$	$\begin{array}{r} 17,759 \\ - 8,790 \\ \hline \end{array}$	$\begin{array}{r} 17,975 \\ - 8,979 \\ \hline \end{array}$	$\begin{array}{r} 15,779 \\ - 8,880 \\ \hline \end{array}$
4.	$\begin{array}{r} 16,335 \\ - 6,497 \\ \hline \end{array}$	$\begin{array}{r} 13,653 \\ - 4,670 \\ \hline \end{array}$	$\begin{array}{r} 15,336 \\ - 6,497 \\ \hline \end{array}$	$\begin{array}{r} 16,335 \\ - 6,947 \\ \hline \end{array}$	$\begin{array}{r} 13,653 \\ - 4,670 \\ \hline \end{array}$
5.	$\begin{array}{r} 13,835 \\ - 7,029 \\ \hline \end{array}$	$\begin{array}{r} 13,853 \\ - 6,993 \\ \hline \end{array}$	$\begin{array}{r} 15,338 \\ - 8,730 \\ \hline \end{array}$	$\begin{array}{r} 15,833 \\ - 9,027 \\ \hline \end{array}$	$\begin{array}{r} 3,358 \\ - 2,690 \\ \hline \end{array}$
6.	$\begin{array}{r} 133,641 \\ - 37,853 \\ \hline \end{array}$	$\begin{array}{r} 113,364 \\ - 23,786 \\ \hline \end{array}$	$\begin{array}{r} 164,133 \\ - 85,238 \\ \hline \end{array}$	$\begin{array}{r} 113,436 \\ - 23,579 \\ \hline \end{array}$	$\begin{array}{r} 136,341 \\ - 38,753 \\ \hline \end{array}$
7.	$\begin{array}{r} 117,732 \\ - 30,680 \\ \hline \end{array}$	$\begin{array}{r} 113,727 \\ - 28,007 \\ \hline \end{array}$	$\begin{array}{r} 112,737 \\ - 30,680 \\ \hline \end{array}$	$\begin{array}{r} 72,731 \\ - 69,973 \\ \hline \end{array}$	$\begin{array}{r} 137,172 \\ - 86,300 \\ \hline \end{array}$
8.	$\begin{array}{r} 121,844 \\ - 30,760 \\ \hline \end{array}$	$\begin{array}{r} 144,821 \\ - 60,730 \\ \hline \end{array}$	$\begin{array}{r} 124,814 \\ - 26,800 \\ \hline \end{array}$	$\begin{array}{r} 81,442 \\ - 79,953 \\ \hline \end{array}$	$\begin{array}{r} 142,481 \\ - 53,080 \\ \hline \end{array}$
9.	$\begin{array}{r} 144,551 \\ - 57,861 \\ \hline \end{array}$	$\begin{array}{r} 141,455 \\ - 60,786 \\ \hline \end{array}$	$\begin{array}{r} 154,145 \\ - 56,079 \\ \hline \end{array}$	$\begin{array}{r} 155,144 \\ - 59,058 \\ \hline \end{array}$	$\begin{array}{r} 145,541 \\ - 78,561 \\ \hline \end{array}$
10.	$\begin{array}{r} 114,225 \\ - 44,148 \\ \hline \end{array}$	$\begin{array}{r} 112,452 \\ - 35,382 \\ \hline \end{array}$	$\begin{array}{r} 42,521 \\ - 41,744 \\ \hline \end{array}$	$\begin{array}{r} 154,122 \\ - 83,415 \\ \hline \end{array}$	$\begin{array}{r} 121,542 \\ - 43,842 \\ \hline \end{array}$
11.	$\begin{array}{r} 118,361 \\ - 89,276 \\ \hline \end{array}$	$\begin{array}{r} 118,136 \\ - 58,928 \\ \hline \end{array}$	$\begin{array}{r} 36,118 \\ - 27,589 \\ \hline \end{array}$	$\begin{array}{r} 183,611 \\ - 92,759 \\ \hline \end{array}$	$\begin{array}{r} 161,183 \\ - 75,893 \\ \hline \end{array}$

28. Step-by-Step Test Drill — Subtraction of Decimals

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1.	.7 — .4	.8 — 5	.9 — .2	.7 — .2	.9 — .7
2.	.11 — .03	.14 — .06	.16 — .09	.17 — .09	.13 — .08
3.	.8 — .45	.9 — .27	.6 — .43	.7 — .42	.9 — .38
4.	.58 — .53	.37 — .34	.87 — .82	.69 — .61	.57 — .52
5.	7 — .275	9 — .624	8 — .328	4 — .275	9 — .345
6.	62.4 — 3	9.27 — 6	43.5 — 6	87.2 — 4	3.86 — 1
7.	.9 — .275	.8 — .126	.7 — .423	.8 — .275	.5 — .116
8.	.3 — .006	.2 — .005	.6 — .009	.4 — .007	.5 — .006
9.	.73 — .2	.95 — .4	.64 — .3	.83 — .5	.97 — .4
10.	624.228 2.5 —	926.645 32.9 —	428.295 8.75 —	346.27 9.3 —	84.695 2.4 —
11.	64.3 2.875 —	826.2 27.375 —	432.9 7.125 —	325.3 3.625 —	927.1 46.875 —
12.	200 — .375	700 — .875	300 — .125	800 — .625	900 — .275

29. Problems from Geography

1. In a certain year the following countries purchased goods from the United States to the amounts listed:

United Kingdom	\$840,066,000	Italy . . .	\$131,650,000
Canada . . .	\$835,878,000	Argentina . .	\$163,350,000
Germany . . .	\$481,581,000	Australia . .	\$159,126,000
France . . .	\$228,746,000	Cuba . . .	\$155,383,000
Japan . . .	\$257,582,000	Netherlands .	\$148,268,000

What was the total value of the goods exported by the United States to these countries?

2. In the same year the United States imported goods to the amounts listed from the following countries:

Canada . . .	\$475,077,000	Brazil . . .	\$203,018,000
Japan . . .	\$402,105,000	Germany . .	\$200,788,000
United Kingdom	\$357,930,000	France . . .	\$167,788,000
British Malaya .	\$277,784,000	China . . .	\$151,680,000
Cuba . . .	\$256,552,000	Mexico . . .	\$137,815,000

What was the total value of the imports from these countries?

3. In 1927, exports from the United States amounted to \$4,864,805,773. Imports amounted to \$4,184,378,182. How much greater was the value of the exports than the value of the imports?

4. The following table shows the percentage of fruit and vegetables supplied to the United States by the three states ranking highest in the amount supplied. Find for each commodity (a) the total per cent supplied by the three states; (b) the per cent supplied by all the other states combined.

<i>Commodity</i>	<i>First</i>		<i>Second</i>		<i>Third</i>	
Apples	Washington	31.2%	New York	17.4%	Idaho	7.5%
Grapes	California	93.8%	New York	2.7%	Michigan	2.3%
Peaches	Georgia	44.4%	California	13.1%	N. Carolina	7.1%
Grapefruit	Florida	92.1%	California	3.7%	Texas	3%
Lemons	California	99.7%	.....		.....	
Oranges	California	66.4%	Florida	32.7%	Alabama	.5%
Potatoes	Maine	19.6%	Texas	13.9%	New York	12.7%

5. The amount of snowfall in New York City during a recent winter was as follows: December, 2.4 in.; January, 3.1 in.; February, 4.0 in.; March, 4.8 in. What was the total for the season?

6. The longest river in Africa is the Nile, which is 3670 mi. long. The Ob, the longest river in Asia, is 3235 mi. long. How much longer is the Nile than the Ob?

*7. The highest point in Africa is Mt. Killimanjaro, which has an altitude of 19,318 ft. The lowest point is in the Libyan Desert and is 440 ft. below sea level. What is the difference in altitude between the highest and the lowest point in Africa?

*8. The highest point in Asia is Mt. Everest, which has an altitude of 29,141 ft. The lowest point is on the Dead Sea, which is 1293 ft. below sea level. What is the difference in altitude between the highest and the lowest point in Asia?

9.	<i>Africa</i>	<i>Asia</i>	<i>Dif- ference</i>
Area	11,510,597 sq. mi.	17,512,000 sq. mi.	?
Population	157,645,000	902,094,774	?

10. Lake Superior, in the United States, has an area of 31,200 sq. mi. The area of Lake Victoria Nyanza, in Africa, is 967 sq. mi. more. What is the area of Lake Victoria Nyanza?

11. Mt. Everest, in Asia, is 29,141 ft. high. Mt. McKinley, in Alaska, is 20,464 ft. high. What is the difference in altitude between Mt. Everest and Mt. McKinley?

12. The length of the four longest rivers in Africa is as follows: Nile, 3670 mi.; Congo, 2800 mi.; Niger, 2600 mi.; Zambezi, 1600 mi. (a) Find the total length of these four rivers. (b) Find the difference between the longest and the shortest river.

13. The length of the ten longest rivers in Asia is as follows:

Ob	3235 mi.	Yenesei	2500 mi.
Yangtze-kiang	3000 mi.	Hwang-ho	2300 mi.
Lena.	2860 mi.	Indus.	2000 mi.
Amur	2700 mi.	Brahmaputra	1800 mi.
Mikong	2600 mi.	Ganges	1455 mi.

What is the total length of these ten rivers?

14. Make up a problem using the information given in Problem 13.

15. Make up a problem using the information given in Problems 12 and 13.

16. Australia has a population of 9,263,372 and an area of 3,455,395 sq. mi. Find the difference in population and area between Asia and Australia. (See Problem 9 for needed facts.)

30. Multiplication

A. $\begin{array}{r} 62.4 \\ 7 \\ \hline 436.8 \end{array}$	B. $\begin{array}{r} 84 \\ .06 \\ \hline 5.04 \end{array}$	C. $\begin{array}{r} .036 \\ .003 \\ \hline .000108 \end{array}$
D. $10 \times 62.48 = 624.8$ $100 \times 62.48 = 6248.$ $1000 \times 62.48 = 62480.$	E. $\begin{array}{r} 6.2 \\ .4 \\ \hline 2.48 \end{array}$	Checks $(1) \quad .4 \quad (2) \quad \begin{array}{r} 6.2 \\ \hline 4.)24.8 \end{array}$ $\quad \quad \quad 6.2 \quad \quad \quad 4.)24.8$ $\quad \quad \quad \hline \quad \quad \quad 2.48$

Remember:

1. *To multiply decimals, multiply as with whole numbers. Then, beginning at the right of the product, point off as many decimal places as there are decimal places in multiplicand and multiplier together.*

2. *Prefix as many zeros as are needed to fill out the required number of decimal places.*

3. *To multiply by 10, 100, 1000, etc., move the decimal point as many places to the right as there are zeros in the multiplier.*

Without pencil.

(a)	(b)	(c)	(d)
1. $3 \times .3$	$3 \times .03$	$3 \times .003$	$.4 \times 2$
2. $6 \times .7$	$6 \times .07$	$6 \times .007$	$6 \times .5$
3. $5 \times .2$	$5 \times .02$	$5 \times .002$	$6 \times .05$
4. $8 \times .4$	$8 \times .04$	$8 \times .004$	$6 \times .005$
5. $.6 \times 4$	$.7 \times 4$	$.8 \times 5$	$.4 \times 5$
6. $.02 \times 5$	$.2 \times .4$	$.3 \times .09$	$.02 \times .04$

	(a)	(b)	(c)	(d)
7.	$.04 \times 8$	$.6 \times .4$	$.6 \times .07$	$.05 \times .02$
8.	$.06 \times 5$	$.08 \times .7$	$.5 \times .08$	$.06 \times .08$
9.	$.08 \times 5$	$.09 \times .6$	$.6 \times .09$	$.06 \times .05$
*10.	$\frac{1}{2}$ of .1	$\frac{3}{4}$ of .2	$\frac{4}{5}$ of .8	$\frac{1}{4}$ of .6
*11.	$\frac{2}{5}$ of .8	$\frac{4}{5}$ of .4	$\frac{2}{3}$ of 2.4	$\frac{5}{8}$ of 6.4

These examples include all the harder multiplication combinations. Can you score 100%?

With pencil.

	(a)	(b)	(c)	(d)
12.	$\begin{array}{r} 6870 \\ 78 \\ \hline \end{array}$	$\begin{array}{r} 4076 \\ 89 \\ \hline \end{array}$	$\begin{array}{r} 8609 \\ 87 \\ \hline \end{array}$	$\begin{array}{r} 9708 \\ 76 \\ \hline \end{array}$
13.	$\begin{array}{r} 6078 \\ 708 \\ \hline \end{array}$	$\begin{array}{r} 6704 \\ 809 \\ \hline \end{array}$	$\begin{array}{r} 9068 \\ 607 \\ \hline \end{array}$	$\begin{array}{r} 8079 \\ 608 \\ \hline \end{array}$
14.	$\begin{array}{r} 9680 \\ 345 \\ \hline \end{array}$	$\begin{array}{r} 8709 \\ 967 \\ \hline \end{array}$	$\begin{array}{r} 4760 \\ 892 \\ \hline \end{array}$	$\begin{array}{r} 6087 \\ 978 \\ \hline \end{array}$
15.	$\begin{array}{r} 9604 \\ 679 \\ \hline \end{array}$	$\begin{array}{r} 9780 \\ 406 \\ \hline \end{array}$	$\begin{array}{r} 8750 \\ 805 \\ \hline \end{array}$	$\begin{array}{r} 5896 \\ 308 \\ \hline \end{array}$
16.	$\begin{array}{r} 38,746 \\ 879 \\ \hline \end{array}$	$\begin{array}{r} 67,890 \\ 467 \\ \hline \end{array}$	$\begin{array}{r} 86,569 \\ 607 \\ \hline \end{array}$	$\begin{array}{r} 96,807 \\ 687 \\ \hline \end{array}$
17.	$\begin{array}{r} 80,467 \\ 596 \\ \hline \end{array}$	$\begin{array}{r} 98,760 \\ 798 \\ \hline \end{array}$	$\begin{array}{r} 96,087 \\ 846 \\ \hline \end{array}$	$\begin{array}{r} 12,345 \\ 908 \\ \hline \end{array}$

31. Drill on the Difficult Multiplication Combinations

TIME: 5 minutes. AIM: First time, a perfect score; second time, a perfect score in less than 5 minutes.

Write the answers only.

A	B	C	D
1. $8 \times 0 + 3$	$0 \times 9 + 8$	$0 \times 5 + 4$	$0 \times 2 + 4$
2. $7 \times 8 + 8$	$9 \times 0 + 6$	$8 \times 8 + 9$	$8 \times 6 + 5$
3. $0 \times 3 + 4$	$0 \times 7 + 2$	$6 \times 0 + 6$	$7 \times 6 + 7$
4. $4 \times 0 + 4$	$4 \times 9 + 7$	$4 \times 0 + 4$	$9 \times 0 + 4$
5. $9 \times 6 + 7$	$6 \times 0 + 4$	$5 \times 0 + 2$	$9 \times 6 + 6$
6. $2 \times 0 + 1$	$7 \times 9 + 7$	$6 \times 9 + 6$	$1 \times 0 + 6$
7. $8 \times 8 + 7$	$8 \times 7 + 7$	$2 \times 0 + 5$	$9 \times 4 + 9$
8. $0 \times 2 + 5$	$0 \times 1 + 4$	$8 \times 7 + 9$	$0 \times 8 + 3$
9. $0 \times 4 + 6$	$5 \times 0 + 8$	$7 \times 0 + 3$	$0 \times 1 + 6$
10. $6 \times 8 + 6$	$5 \times 0 + 5$	$7 \times 8 + 9$	$6 \times 8 + 9$
11. $8 \times 0 + 4$	$7 \times 0 + 1$	$4 \times 0 + 2$	$9 \times 0 + 8$
12. $9 \times 4 + 8$	$9 \times 6 + 9$	$1 \times 0 + 3$	$4 \times 9 + 9$
13. $0 \times 8 + 4$	$6 \times 9 + 9$	$6 \times 8 + 7$	$0 \times 3 + 5$
14. $8 \times 6 + 9$	$0 \times 1 + 6$	$6 \times 0 + 8$	$3 \times 0 + 2$
15. $7 \times 0 + 6$	$7 \times 6 + 9$	$0 \times 4 + 3$	$0 \times 7 + 3$
16. $7 \times 8 + 7$	$1 \times 0 + 4$	$6 \times 7 + 5$	$9 \times 7 + 7$
17. $0 \times 2 + 1$	$8 \times 6 + 6$	$0 \times 2 + 6$	$0 \times 3 + 8$
18. $4 \times 9 + 8$	$0 \times 9 + 2$	$8 \times 6 + 7$	$9 \times 4 + 7$
19. $3 \times 0 + 5$	$6 \times 8 + 5$	$0 \times 7 + 5$	$8 \times 0 + 6$
20. $8 \times 7 + 8$	$0 \times 8 + 1$	$6 \times 9 + 7$	$6 \times 7 + 7$

32. Placing the Decimal Point in Multiplication

What is the rule for placing the decimal point in the product when multiplying decimals?

Rewrite the answers given in the following exercise and complete them by placing the decimal point in the proper place. Work for a perfect score:

- | | |
|--------------------------------|----------------------------------|
| 1. $83.6 \times 2.46 = 205656$ | 9. $8.36 \times 24.6 = 205656$ |
| 2. $83.6 \times 24.6 = 205656$ | 10. $.836 \times 24.6 = 205656$ |
| 3. $836 \times 24.6 = 205656$ | 11. $8.36 \times 2.46 = 205656$ |
| 4. $83.6 \times .246 = 205656$ | 12. $8.36 \times .246 = 205656$ |
| 5. $836 \times 2.46 = 205656$ | 13. $836 \times .246 = 205656$ |
| 6. $.836 \times 2.46 = 205656$ | 14. $.836 \times .246 = 205656$ |
| 7. $.836 \times 246 = 205656$ | 15. $83.6 \times 246 = 205656$ |
| 8. $836 \times 246 = 205656$ | 16. $.0836 \times 2.46 = 205656$ |

Select the correct product. Try for a perfect score:

<i>Example</i>		<i>Products</i>	
17. 32.5×434	141.050	1410.50	14105.0
18. $325 \times .434$	141.050	1.41050	14105.0
19. $.325 \times .434$	14105.0	141.050	.141050
20. 3.25×4.34	14.1050	1.41050	1410.50
21. 32.5×4.34	14105.0	1410.50	141.050
22. 32.5×43.4	14.1050	1410.50	141.050
23. $32.5 \times .434$	14105.0	14.1050	141.050
24. 325×4.34	14.1050	.141050	1410.50
25. $3.25 \times .434$	1.41050	1410.50	141.050
26. 3.25×434	1410.50	14.1050	14105.0
27. $.325 \times 434$	141.050	141050	1410.50
28. 325×43.4	1.41050	14105.0	.141050

33. Problems in Multiplication

1. A rod equals 16.5 ft. How many feet are there in 12.5 rd.?
2. The average monthly rainfall in New York for one year was 4.14 in. What was the rainfall for the year?
3. An automobile averages 26.5 mi. an hour. At this rate, how far will it travel in 16.5 hr.?
4. A laundry charges \$.60 a dozen for towels. What will be the bill for 28 towels at this rate?
5. A gallon of milk weighs 8.6 lb. What is the weight of 45.5 gal.?
6. An airplane averaged 142.6 mi. an hour for 4.5 hr. How far did it travel in that time?
7. A train averaging 46.25 mi. an hour will travel _____ mi. in 14.25 hr.
8. Multiply by 10: .6, 27.5, .46, 320, .086
9. Multiply by 100: 3.64, 4.26, 53.6, .6, .275
10. Multiply by 1000: 46.2, .0568, 53.2, 6.45, .2785

Find the cost of

11. 24 lb. lard @ \$.195 per pound.
12. 3.5 yd. ribbon @ \$.85 per yard.
13. 58 bu. potatoes @ \$.936 per bushel.
14. 75 bu. wheat @ \$1.16 per bushel.
15. 15 T. hay @ \$10.60 per ton.
16. 25 T. coal @ \$14.50 per ton.
17. 100 ft. wire @ \$.025 per foot.
18. 1000 ft. fence wire @ \$.125 per foot.
19. In a motorboat race at Detroit, one entrant averaged 55.65 mi. per hour. How many miles did he travel in 2.4 hr.?

34. Step-by-Step Test Drill — Multiplication of Decimals

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1.	$\begin{array}{r} 780.6 \\ \underline{8} \end{array}$	$\begin{array}{r} 60.47 \\ \underline{9} \end{array}$	$\begin{array}{r} .8609 \\ \underline{7} \end{array}$	$\begin{array}{r} 8.709 \\ \underline{6} \end{array}$	$\begin{array}{r} 84.97 \\ \underline{7} \end{array}$
2.	$\begin{array}{r} 623 \\ \underline{.42} \end{array}$	$\begin{array}{r} 7456 \\ \underline{6.9} \end{array}$	$\begin{array}{r} 8346 \\ \underline{7.2} \end{array}$	$\begin{array}{r} 8746 \\ \underline{.69} \end{array}$	$\begin{array}{r} 3945 \\ \underline{.72} \end{array}$
3.	$\begin{array}{r} 8645 \\ \underline{2.8} \end{array}$	$\begin{array}{r} 945.6 \\ \underline{65} \end{array}$	$\begin{array}{r} 8325 \\ \underline{7.8} \end{array}$	$\begin{array}{r} 459.6 \\ \underline{45} \end{array}$	$\begin{array}{r} 8295 \\ \underline{7.8} \end{array}$
4.	$\begin{array}{r} 48 \\ \underline{.25} \end{array}$	$\begin{array}{r} .75 \\ \underline{28} \end{array}$	$\begin{array}{r} .64 \\ \underline{25} \end{array}$	$\begin{array}{r} 84 \\ \underline{.75} \end{array}$	$\begin{array}{r} .25 \\ \underline{84} \end{array}$
5.	$\begin{array}{r} 364.5 \\ \underline{.58} \end{array}$	$\begin{array}{r} 92.75 \\ \underline{.56} \end{array}$	$\begin{array}{r} 329.5 \\ \underline{.84} \end{array}$	$\begin{array}{r} 69.35 \\ \underline{.86} \end{array}$	$\begin{array}{r} 936.5 \\ \underline{.46} \end{array}$
6.	$\begin{array}{r} 8.79 \\ \underline{.004} \end{array}$	$\begin{array}{r} .687 \\ \underline{.08} \end{array}$	$\begin{array}{r} 60.79 \\ \underline{.006} \end{array}$	$\begin{array}{r} 8.326 \\ \underline{.009} \end{array}$	$\begin{array}{r} 45.68 \\ \underline{.007} \end{array}$
7.	$\begin{array}{r} .0125 \\ \underline{.75} \end{array}$	$\begin{array}{r} .0875 \\ \underline{.25} \end{array}$	$\begin{array}{r} .0625 \\ \underline{.65} \end{array}$	$\begin{array}{r} .0375 \\ \underline{.43} \end{array}$	$\begin{array}{r} .0268 \\ \underline{.36} \end{array}$
8.	$\begin{array}{r} 7.06 \\ \underline{.025} \end{array}$	$\begin{array}{r} 80.92 \\ \underline{.075} \end{array}$	$\begin{array}{r} 40.62 \\ \underline{.075} \end{array}$	$\begin{array}{r} 8.024 \\ \underline{.05} \end{array}$	$\begin{array}{r} 62.08 \\ \underline{.075} \end{array}$
9.	$\frac{5}{8}$ of .72	$\frac{5}{7}$ of .56	$\frac{3}{4} \times .32$	$\frac{5}{7} \times .63$	$\frac{4}{5} \times .45$
10.	$100 \times .046$	$1000 \times .0375$	$10 \times .096$	$100 \times .0642$	$1000 \times .0625$
11.	1000×82.6	100×46.8	37.5×100	1000×6.42	1000×2.68

35. Division

A. $\begin{array}{r} .8 \\ 8\overline{)6.4} \end{array}$	B. $\begin{array}{r} .003 \\ 5\overline{).015} \end{array}$	C. $\begin{array}{r} 1.7 \\ 1\cancel{5}.\overline{)2\cancel{5}.5} \end{array}$
D. $\begin{array}{r} 3120. \\ \cancel{1}002.\overline{)6\cancel{1}240.} \end{array}$	E. $\begin{array}{r} 312000. \\ \cancel{1}002.\overline{)624\cancel{1}000.} \end{array}$	F. $\begin{array}{r} 1.274 \\ 6\cancel{0}\cancel{0}\cancel{0}\overline{)7.644\cancel{1}} \end{array}$

Remember:

- 1. *Make the divisor a whole number by moving the decimal point to the right.*
- 2. *Move the decimal point in the dividend as many places to the right as there are decimal places in the divisor.*
- 3. *Place the decimal point in the quotient.*
- 4. *Divide as in division by a whole number.*
- 5. *When dividing by 10, 100, 1000, or their multiples, cross out the zeros in the divisor and move the decimal point in the dividend as many places to the left as there are zeros in the divisor.*
- 6. *Check your work by multiplying the quotient by the original divisor.*

Without pencil.

Give the quotient:

(a)	(b)	(c)	(d)	(e)
1. $3\overline{)6.3}$	$.06\overline{).72}$	$5\overline{)4}$	$1.1\overline{)5.5}$	$4\overline{).8}$
2. $4\overline{).8}$	$.5\overline{)2}$	$.2\overline{).6}$	$.2\overline{).18}$	$7\overline{)3.5}$
3. $6\overline{).12}$	$2\overline{)4.2}$	$.12\overline{).84}$	$.4\overline{).32}$	$1.2\overline{)7.2}$

	(a)	(b)	(c)	(d)	(e)
4.	$7\overline{)2.8}$	$3\overline{).9}$	$.8\overline{)4}$	$12\overline{)6}$	$.8\overline{)4.}$
5.	$6\overline{)3}$	$6\overline{).24}$	$.12\overline{)4.8}$	$.5\overline{).2}$	$.5\overline{)2}$

In the following examples, write only the first figure of the quotient:

	(a)	(b)	(c)	(d)
6.	$43\overline{)478}$	$42\overline{)864}$	$57\overline{)658}$	$26\overline{)437}$
7.	$68\overline{)613}$	$47\overline{)436}$	$57\overline{)1756}$	$77\overline{)694}$
8.	$43\overline{)329}$	$52\overline{)453}$	$42\overline{)824}$	$63\overline{)493}$
9.	$34\overline{)334}$	$42\overline{)418}$	$64\overline{)637}$	$72\overline{)718}$

With pencil.

- | | |
|--|-----------------------------|
| 10. $63,878 \div 325 = ?$ | 16. $? \times 54 = 108,432$ |
| 11. $? \times 43 = 9245$ | 17. $83 \times ? = 170,980$ |
| 12. $47 \times ? = 32,477$ | 18. $131,126 \div 262 = ?$ |
| 13. $45,926 \div 37 = ?$ | 19. $60,231 \div 75 = ?$ |
| 14. $? \times 78 = 79,248$ | 20. $13,515 \div 27 = ?$ |
| 15. $92,645 \div 428 = ?$ | 21. $129,440 \div 16 = ?$ |
| 22. Divide by 10: 72.4, 6.24, .624, 624, .0624 | |
| 23. Divide by 100: 3246, 324.6, .3246, 32.46, 3.246 | |
| 24. Divide by 1000: 4598, 45.98, .4598, 4.598, 459.8 | |
| 25. $246.3 \div 600$ | 29. $324.5 \div 2700$ |
| 26. $82.45 \div 7000$ | 30. $564.8 \div 5200$ |
| 27. $2457 \div 900$ | 31. $5.648 \div 6500$ |
| 28. $456.8 \div 2000$ | 32. $4.983 \div 4600$ |

36. Buying by the Hundred and the Thousand

What does the Roman number C stand for? The Roman number M? The abbreviation *cwt.*?

What is the cost of 850 envelopes at \$2.50 per hundred?

Divide 850 by 100.	\$2.50
$850 \div 100 = 8.5$	8.5
$8.5 \times \$2.50 = \text{cost of envelopes}$	$\begin{array}{r} 1250 \\ 2000 \\ \hline \$21.250 \end{array}$

What must Mr. Lucas pay for 5300 ft. of Georgia pine at \$65 per thousand feet?

Divide 5300 by 1000.	\$65
$5300 \div 1000 = 5.3$	5.3
$5.3 \times \$65 = \text{cost of pine}$	$\begin{array}{r} 195 \\ 325 \\ \hline \$344.5 = \$344.50 \end{array}$

Find the cost of the following:

1. 6000 lb. of sugar at \$6.25 per cwt.
2. 2500 cigars at \$6.50 per C.
3. 1400 lb. of freight shipped at the rate of \$.35 per cwt.
4. 7500 laths at \$.75 per C.
5. 2500 cu. ft. of gas at \$1.20 per M.
6. 2650 ft. of yellow pine at \$48 per M.
7. 15,200 ft. of oak flooring at \$115 per M.

8. 7200 envelopes at \$4.25 per M.
9. 2600 lb. of hay at \$1.20 per cwt.
10. 1500 lb. of maple sugar at \$19 per cwt.
11. 800 lb. of honey at \$12.50 per cwt.
12. 500 ice-cream cones at \$.95 per C.
13. A hundred-pound sack of sugar costs \$6.25. What is the cost of one pound?
14. Mary bought 100 ft. of chicken wire for \$6. What was the cost per foot?
15. Mr. Brown has a 100-acre farm which he planted in wheat. His crop amounted to 3462 bu. What was the average yield per acre?

37. Review of Difficult Combinations in Division

These examples supply drill on hard combinations. Can you score 100%? Don't forget to turn the page.

Write the answers only.

A	B	C	D
1. $7\overline{)560}$	2. $2\overline{)182}$	1. $1\overline{)91260}$	4. $4\overline{)3224}$
2. $4\overline{)284}$	4. $4\overline{)432}$	4. $4\overline{)3628}$	5. $5\overline{)1040}$
3. $2\overline{)162}$	5. $5\overline{)405}$	6. $6\overline{)546}$	3. $3\overline{)2703}$
4. $5\overline{)400}$	6. $6\overline{)654}$	5. $5\overline{)5400}$	2. $2\overline{)216}$
5. $1\overline{)36102}$	7. $7\overline{)707}$	6. $6\overline{)186}$	6. $6\overline{)5418}$
6. $6\overline{)306}$	8. $8\overline{)6424}$	7. $7\overline{)350}$	7. $7\overline{)357}$

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
7.	$9\overline{)5409}$	$6\overline{)1842}$	$8\overline{)8064}$	$3\overline{)1836}$
8.	$4\overline{)2436}$	$9\overline{)6390}$	$4\overline{)436}$	$1\overline{)16209}$
9.	$4\overline{)2832}$	$1\overline{)9339}$	$6\overline{)4218}$	$8\overline{)2480}$
10.	$8\overline{)5608}$	$3\overline{)6183}$	$1\overline{)21069}$	$6\overline{)3042}$
11.	$7\overline{)567}$	$4\overline{)244}$	$6\overline{)4824}$	$2\overline{)218}$
12.	$6\overline{)3054}$	$8\overline{)4824}$	$9\overline{)7236}$	$5\overline{)100}$
13.	$9\overline{)5409}$	$4\overline{)824}$	$7\overline{)7056}$	$6\overline{)4248}$
14.	$2\overline{)1618}$	$9\overline{)4554}$	$3\overline{)1860}$	$9\overline{)5445}$
15.	$6\overline{)2430}$	$7\overline{)3507}$	$8\overline{)6448}$	$7\overline{)5635}$
16.	$3\overline{)3027}$	$9\overline{)9072}$	$4\overline{)832}$	$6\overline{)2448}$
17.	$4\overline{)368}$	$5\overline{)105}$	$9\overline{)3645}$	$9\overline{)9360}$
18.	$8\overline{)8560}$	$9\overline{)4536}$	$1\overline{)62013}$	$4\overline{)288}$
19.	$6\overline{)4824}$	$9\overline{)6354}$	$9\overline{)7263}$	$5\overline{)510}$
20.	$1\overline{)16023}$	$7\overline{)7056}$	$2\overline{)1816}$	$9\overline{)6372}$

38. Selecting the Quotient

Select the correct quotient. Try for a perfect score:

<i>Example</i>		<i>Quotients</i>			
1.	$.135042 \div 317$	.000426	.0426	.426	4.26
2.	$135042 \div .317$	426000	426	.426	42.6
3.	$135.042 \div .317$	4260	426	.0426	4.26
4.	$13.5042 \div 31.7$	.426	.0426	42.6	4.26
5.	$13.5042 \div 3.17$	426	4.26	.426	42.6
6.	$1.35042 \div 3.17$	42.6	.426	.0426	4260
7.	$13504.2 \div 317$	.426	42.6	426	4.26
8.	$13.5042 \div 317$	.0426	426	.426	4260
9.	$135042 \div 31.7$	42.6	4.26	4260	.426
10.	$.135042 \div 31.7$	426	.00426	.0426	42.6
11.	$13504.2 \div 31.7$	426	4260	4.26	.426
12.	$1350.42 \div 31.7$	42.6	.426	4260	.0426
13.	$.135042 \div 3.17$	.0426	.426	.00426	4.26
14.	$1350.42 \div 317$	.426	42.6	.0426	4.26
15.	$13.5042 \div .317$	.426	42.6	.0426	426
16.	$135.042 \div 317$	4.26	.426	426	42.6
17.	$1.35042 \div .317$	4.26	.00426	.426	4.26
18.	$1.35042 \div 317$	.00426	.0426	4.26	42.6
19.	$135042 \div 3.17$	.426	42600	42.6	.0426
20.	$135042 \div 3.17$	42600	42.6	.426	.0426
21.	$.135042 \div .317$	.426	4260	42.6	4.26
22.	$135.042 \div 31.7$	4.26	42.6	.426	4260
23.	$1.35042 \div 31.7$	.0426	.426	42.6	4.26
24.	$1.35042 \div .0317$	.0426	.00426	42.6	4.26

39. Step-by-Step Test Drill — Division of Decimals

Do not carry the quotient beyond three decimal places.

	A	B	C	D	E
1.	$73 \overline{) \$91.25}$	$57 \overline{) \$402.47}$	$26 \overline{) \$220.48}$	$54 \overline{) \$178.58}$	$24 \overline{) \$200.64}$
2.	$63 \overline{) 516.6}$	$53 \overline{) 397.5}$	$76 \overline{) 623.2}$	$63 \overline{) 592.2}$	$57 \overline{) 454.6}$
3.	$58 \overline{) 96.834}$	$53 \overline{) 83.245}$	$76 \overline{) 86.485}$	$42 \overline{) 82.936}$	$37 \overline{) 96.456}$
4.	$95 \overline{) 6.3458}$	$89 \overline{) 7.5823}$	$79 \overline{) 6.9365}$	$98 \overline{) 8.4626}$	$67 \overline{) 6.2456}$
5.	$78 \overline{) .2364}$	$77 \overline{) .2562}$	$38 \overline{) .2453}$	$56 \overline{) .1764}$	$28 \overline{) .1952}$
6.	$75 \overline{) 244.5}$	$28 \overline{) 107.8}$	$55 \overline{) 110.1}$	$34 \overline{) 130.9}$	$46 \overline{) 177.1}$
7.	$\$64 \div 25$	$\$42 \div 24$	$\$95 \div 52$	$\$108 \div 48$	$\$60 \div 48$
8.	$327 \div 36$	$456 \div 35$	$920 \div 27$	$729 \div 56$	$398 \div 36$
9.	$6324 \div 37$	$8336 \div 52$	$8208 \div 54$	$9394 \div 36$	$8496 \div 53$
10.	$\frac{75}{85}$	$\frac{32}{45}$	$\frac{26}{34}$	$\frac{43}{54}$	$\frac{24}{28}$
11.	$\frac{175}{58}$	$\frac{82}{43}$	$\frac{56}{27}$	$\frac{75}{42}$	$\frac{32}{18}$
12.	$6.2 \overline{) 6.246}$	$.28 \overline{) .8235}$	$2.3 \overline{) 5.827}$	$.38 \overline{) 9.286}$	$2.1 \overline{) .4532}$
13.	$8.5 \overline{) 268}$	$3.2 \overline{) 925}$	$7.3 \overline{) 645}$	$9.4 \overline{) 468}$	$6.5 \overline{) 834}$
14.	$.326 \overline{) 24.8}$	$.236 \overline{) 5.35}$	$.436 \overline{) 327.2}$	$.924 \overline{) 875.3}$	$.648 \overline{) 43.6}$
15.	$624 \div 1600$	$843 \div 2500$	$438 \div 3600$	$479 \div 9000$	$927 \div 5000$

40. Problems about Rainfall

In the following table you will find the monthly rainfall, in inches, in certain cities in 1928:

STATION	<i>Jan.</i>	<i>Feb.</i>	<i>Mar.</i>	<i>Apr.</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug.</i>	<i>Sept.</i>	<i>Oct.</i>	<i>Nov.</i>	<i>Dec.</i>
Albany	2.6	2.5	2.7	2.4	3.0	3.8	3.9	4.0	3.2	3.0	2.8	2.6
Atlanta	4.9	4.8	5.3	3.6	3.5	3.8	4.7	4.4	3.0	2.6	3.0	4.7
Boston	3.6	3.4	3.6	3.3	3.2	2.9	3.5	3.6	3.1	3.2	3.3	3.4
Chicago	2.0	2.2	2.6	2.9	3.4	3.7	3.6	2.9	3.0	2.6	2.5	2.1
Denver	0.4	0.5	1.0	2.1	2.2	1.4	1.7	1.4	1.0	1.0	0.6	0.7
Galveston	3.4	2.8	2.7	3.1	3.4	4.4	3.7	4.3	5.6	4.4	3.3	3.8
Los Angeles	2.8	2.9	3.0	1.1	0.5	0.1	0.0	0.0	0.1	0.8	1.5	2.9
Mobile	4.8	5.3	6.0	4.6	4.3	5.4	6.0	5.9	5.0	3.6	3.6	5.4
New Orleans	4.3	4.2	4.7	5.2	4.6	5.9	6.4	5.8	5.0	3.3	3.1	4.8
New York	3.8	3.7	4.1	3.3	3.2	3.3	4.5	4.5	3.6	3.7	3.4	3.4
Pittsburgh	2.9	2.7	3.0	2.9	3.3	3.9	4.4	3.2	2.5	2.4	2.6	2.7
Seattle	4.9	3.7	2.7	2.4	1.8	1.4	0.6	0.6	1.7	2.7	5.3	5.4

1. Find the total yearly rainfall in each city.
2. Find the average monthly rainfall in each city.
3. Rearrange the cities according to the total rainfall, placing the city with the greatest amount at the top.
4. Which city had the greatest rainfall in each month?
5. Which cities had the same amount of rainfall for December? For November? For September? For June?
6. What is the difference between the rainfall for January and June for the following cities: Denver, Los Angeles, Mobile, Atlanta, New York?
7. Which city had less than one inch of rainfall during five consecutive months?

41. Practice with Decimals

1. Find the difference between six tenths and six hundredths.

2. How much more than fifteen hundredths is fifteen?

3. Arrange the following numbers in order of size, writing the number of least value first:

64.4 6.044 64.04 4604 6.44 .644 600.4

4. Three thousandths plus three thousand equal ____.

5. Rewrite the following in words: 4.62, 46.2, .462, .0462, 4620.

6. How much must be added to eight thousandths to make eight hundredths?

7. How much less than one is one thousandth?

8. Change the common fraction seven eighths to a decimal fraction.

9. Change the decimal twenty-five hundredths to a common fraction.

10. Rewrite as decimals and find the sum: three tenths, eight thousandths, five, six and fifty-five hundred thousandths.

11. What happens when a zero is annexed at the right of a whole number?

12. What happens when a zero is annexed to the last digit of a decimal fraction?

13. Which is larger: .7 or .69?

14. How many decimal places are there in the product of 3.06 and .29?

15. What happens when the decimal point in a number is moved one place to the right? What happens when it is moved one place to the left?

42. What You Should Know about Decimals

Supply the missing words:

1. Any digit in a decimal represents ten times as much in value as the same digit in the next place to the ____.

2. Any digit in a decimal represents ____ as much in value as the same digit in the next place to the left.

3. A ____ to the right of the last digit in a decimal does not change the value.

4. The zero in 0.3 does ____ change the value of the decimal.

5. When adding decimals, place ____ under ____.

6. When subtracting decimals, place the ____ in the subtrahend exactly under the ____ in the ____.

7. To multiply by 1000, move the decimal point ____ places to the ____.

8. To divide by 100, move the decimal point ____ places to the ____.

9. When multiplying decimals, multiply as with integers and point off in the ____ as many decimal places as there are decimal places in both ____ and ____.

10. To divide a decimal by a decimal, move the decimal point in the ____ as many places to the ____ as there are decimal places in the divisor. Then place the decimal point in the quotient over the decimal point in the ____.

11. A decimal fraction may be written as a ____ fraction. $.3 = \underline{\hspace{1cm}}$.

12. $.75$ may be written as a common fraction with ____ for its numerator and ____ for its denominator.

13. Per cents may be changed to ____ or ____ fractions.

14. The whole of anything may be expressed as ____ per cent.

43. Percentage

You have learned to express a part of a number as (1) a common fraction; (2) a decimal; (3) a per cent. For example, one fourth may be expressed as the common fraction $\frac{1}{4}$, or as the decimal fraction .25, or as 25%.

“Per cent” means *by the hundred*. The expression “per cent” is commonly used in business to denote *hundredths*, or *hundredths times*. The sign for per cent is %.

- | | | | |
|----------|------|-------|-------------------|
| 1. Read: | 6% | 1.5% | $16\frac{2}{3}\%$ |
| | 35% | 2.8% | $12\frac{1}{2}\%$ |
| | 125% | 15.3% | $8\frac{1}{3}\%$ |

2. Write, using the per cent sign: one per cent; one hundred per cent; thirty-seven and one-half per cent.

3. Write in decimal form: 15%, 7%, $7\frac{1}{2}\%$, 105%

4. Write as per cents, using the per cent sign:

.07	.18	$\frac{7}{100}$	$\frac{5}{100}$
$.16\frac{2}{3}$	.01	$\frac{25}{100}$	$33\frac{1}{3}\%$

5. Complete the following:

<i>Example:</i>	18%	18 per cent	.18	$\frac{18}{100}$	<i>eighteen hundredths</i>
(a)		9 per cent			
(b)				$\frac{6}{1000}$	
(c)			.075		
(d)	$12\frac{1}{2}\%$				
(e)					five thousandths
(f)	125%				
(g)			.05		
(h)	1%				

Finding a per cent of a number is the same as multiplying the number by a decimal.

Without pencil.

1. Complete and solve:

(a) 8% of \$720 = $.08 \times$ _____

(b) 12% of \$960 = _____ $\times$ \$960

(c) 4% of \$1528 = _____ $\times$ _____

(d) 25% of \$644 = $.25$ _____ \$644

2. Our spelling test this morning consisted of 40 words. Anna's rating was 90% . How many words did Anna spell correctly?

3. On a stormy day the attendance record of a class of 36 pupils showed that 25% of the pupils were absent. _____ pupils were absent; _____ pupils were present.

4. Our team played 20 games this season. We lost 10% of all the games played. How many games did we lose?

5. A certain team played 40 games during the baseball season and won 80% of the games it played. (a) How many games did the team win? (b) How many games did it lose?

6. Mary should weigh 120 lb. Her present weight is 5% below the average. (a) How many pounds is she below the average weight? (b) What does she weigh at present?

7. On September 9 there were 32 pupils on register in a 7A class. During the month, this number was increased by 25% . How many new pupils were enrolled during the month?

Use pencil when needed.

8. In a school of 2500 pupils, 98% joined the Red Cross. (a) How many joined the organization? (b) How many did not join? (c) What per cent did not join?

9. During a school year of 190 days, Mary Murray attended 90% of the time. How many days did Mary attend school?

10. Fred weighed 64 lb. in June. During the vacation period he gained $12\frac{1}{2}\%$ in weight. (a) He gained _____ pounds. (b) Then he weighed _____ pounds.

11. In a school of 1900 pupils, 92% were promoted at the end of the term. _____ pupils were promoted; _____ pupils were not promoted.

12. In Jackson School, 85% of the boys have bank accounts. If there are 720 boys in the school, _____ boys are depositors in the school bank, and _____ boys have no accounts.

With pencil.

13. A man earns \$6500 per year. He spends 30% of his income for rent. How much does he spend for rent?

14. A library contains 1664 books. Of these, $12\frac{1}{2}\%$ are reference books. There are _____ reference books in the library.

15. A man saves 15% of his salary of \$450 per month. How much money does he save each month?

16. For our school entertainment we had 960 tickets printed. Of these, 95% were sold. (a) How many tickets were sold? (b) How many remained unsold? (c) If the tickets were sold at 5¢ each, how much money was received?

17. There are 1260 girls in a junior high school. Of these, $33\frac{1}{3}\%$ are in eighth-year classes. There are _____ girls in eighth-year classes.

*18. A dealer bought goods for \$1750 and sold them at 45% profit. (a) What was the amount of his profit? How much did he receive for the goods?

*19. A family having an income of \$4000 per year spent 25% for food, 20% for rent, 15% for operating expenses, and 20% for clothing. The remainder was used for insurance and savings. (a) How much money was allowed for food? (b) For rent? (c) For operating expenses? (d) For clothing? (e) What per cent of the income was used for insurance and savings?

20. A farmer raised 450 bu. of wheat and sold 75% of his crop. How many bushels of wheat did he sell?

*21. In an orchard of 2400 trees, 25% were apple trees, 15% were pear trees, and $37\frac{1}{2}\%$ were cherry trees. The remainder were peach trees. (a) How many trees of each kind were planted in the orchard? (b) What per cent of the trees were peach trees?

45. Adding and Subtracting Per Cents

You know that $\frac{2}{2}$ equals one unit, or one. The same is true of $\frac{3}{3}$ and of $\frac{4}{4}$ and of $\frac{5}{5}$ and of $\frac{10}{10}$.

$\frac{100}{100}$ of a number equals the number itself. Similarly, since 100% is the same as $\frac{100}{100}$ of a number, 100% of a number equals the number itself.

1. Complete the following:

- | | |
|----------------------------|---------------------------|
| (a) 100% of \$250 is _____ | (d) 100% of 3.6 is _____ |
| (b) 100% of \$75 is _____ | (e) 100% of .36 is _____ |
| (c) 100% of 36 is _____ | (f) 100% of .036 is _____ |

2. (a) $100\% + 25\% = ?$ (c) $100\% - 25\% = ?$
(b) $100\% + 18\% = ?$ (d) $100\% - 46\% = ?$

3. Class 7A had a midterm test in grammar, on which 25% of the class were rated A, 35% were rated B, and 15% were rated C. The remainder of the class were rated D. What per cent of the class received a rating of D?

*4. In a recent spelling test, 25% of a class of 40 pupils received a grade of 100, 40% received 95, and 15% received 90. The remainder of the class received grades between 85 and 90. Find the number of pupils in each group. How can you check your answers?

5. A farmer had 160 A. of land under cultivation, of which 40% was planted in rye, 25% was planted in wheat, and the remainder was planted in corn. How many acres were planted in corn?

6. By the terms of a man's will, his estate of \$24,000 was divided among his two daughters and a son. Each daughter received 35% of the estate. The remainder was left to the son. (a) What per cent of the estate did the son receive? (b) How much money did each child receive?

7. At different times, Mr. Atkins sold 35%, 18%, and 20% of his crop of potatoes. (a) What per cent of his entire crop did he sell? (b) What per cent had he left?

46. Per Cents More Than 100

There are 40 pupils in a seventh-grade class. If 100% are present, how many pupils are present?

100% of a number = the number itself.
Therefore, 40 pupils were present.

In 1900 the number of voters in a certain town was 320. In 1929, the number of voters was 200% of what it was in 1900. How many voters were there in 1929?

$$200\% = \frac{200}{100} = 2$$

There were *twice* as many voters in 1929 as in 1900.

$$2 \times 320 = 640 \text{ voters in 1929}$$

1. Complete: (a) $500\% = \frac{500}{?} = 5$

(b) $? = \frac{400}{100} = 4$

(c) $900\% = \frac{?}{100} = 9$

(d) $700\% = \frac{700}{100} = ?$

2. What number is 300% of 75?

3. Because of an increase in population in the town of Newton, the receipts of the Union Gas Company in that town are 300% as great now as they were ten years ago. How many *times* as great are the receipts today?

Last year James Burton earned \$600. This year his earnings are 125% of what they were last year. What are his earnings this year?

A. $125\% = \frac{125}{100} = \frac{5}{4}$

$$\frac{5}{4} \times \frac{\$150}{\cancel{\$600}} = \$750$$

B. $125\% = \frac{125}{100} = 1.25$

$$1.25 \times \$600 = \$750$$

4. Complete the following:

(a) 125% of 560 = $\frac{\quad}{\quad} \times 560$

(b) 150% of 880 = $\frac{\quad}{\quad} \times 880$

$$(c) \ 225\% \text{ of } 1284 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$$

$$(d) \ 340\% \text{ of } 520 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$$

$$(e) \ 133\frac{1}{3}\% \text{ of } 426 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$$

$$(f) \ 116\frac{2}{3}\% \text{ of } 906 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$$

5. Find: (a) $312\frac{1}{2}\%$ of \$324.40

(b) 125 % of \$248

(c) 175 % of \$24.72

(d) 275 % of \$48.60

47. Short Ways of Finding Per Cent

Fred is bank manager of his class. He reports that, of 40 boys in his class, 10% have no bank accounts at present. How many boys are without accounts?

$$10\% = .10 = \frac{10}{100} = \frac{1}{10}$$

$$\frac{1}{10} \text{ of } 40 \text{ boys} = 4 \text{ boys}$$

In a class of 36 pupils, 25% had perfect attendance for the month of May. How many pupils had perfect attendance?

A. Per cent changed to decimal equivalent

$$25\% = .25$$

$$\begin{array}{r} 36 \\ .25 \\ \hline 1\ 80 \\ 7\ 2 \\ \hline 9.00 \text{ pupils} \end{array}$$

B. Per cent changed to fractional equivalent

$$25\% = \frac{25}{100} = \frac{1}{4}$$

$$\frac{1}{4} \times \overset{9}{\cancel{36}} = 9 \text{ pupils}$$

To find a per cent of a number, change the per cent to its fractional or decimal equivalent and then multiply.

Which method is shorter? Which do you prefer to use?

Change the following per cents to common fractions and solve:

- | | |
|---------------------------------|----------------------------------|
| 1. (a) 25 % of \$3.28 | (e) $12\frac{1}{2}\%$ of \$9.60 |
| (b) 50 % of \$12.60 | (f) $37\frac{1}{2}\%$ of 48.8 |
| (c) 75 % of 3.6 | (g) 40 % of \$3.20 |
| (d) $66\frac{2}{3}\%$ of 4.8 | (h) $33\frac{1}{3}\%$ of \$96.30 |
| (i) $62\frac{1}{2}\%$ of \$1.44 | |

- | | |
|------------------------------------|----------------------------------|
| 2. (a) $87\frac{1}{2}\%$ of 43.2 = | (c) 70 % of 28.56 = |
| (b) $66\frac{2}{3}\%$ of 1546 = | (d) $16\frac{2}{3}\%$ of 72.06 = |

3. What number is 20% of 25? Of 35? Of 60?

4. Miss Slater gave 12 examples as a test in percentage. John's paper was graded 75%. How many examples did he work correctly?

5. George had 60¢ this morning. He spent 40% of it for stationery. How much did he spend?

6. A man earns \$750 per month. If his salary is increased 20%, how much more money will he earn per month?

7. A farmer raised 2730 bu. of wheat. He sold $33\frac{1}{3}\%$ of his crop to a neighbor. How many bushels did he sell?

8. A real-estate dealer bought a lot for \$1280. He sold it at a gain of $12\frac{1}{2}\%$. (a) How much money did he gain?
(b) How much did he receive for the lot?

48. Finding What Per Cent One Number Is of Another

A grocer had 60 lb. of coffee on hand. He sold 30 lb.
 (a) What *part* of his stock did he sell? (b) What *per cent* of his stock did he sell?

A. 60 lb. = total stock $30 \text{ lb.} = \frac{30}{60} = \frac{3}{6} = \frac{1}{2}$ The grocer sold $\frac{1}{2}$ of his stock of coffee.	B. 60 lb. = 100% of stock $30 \text{ lb.} = \frac{30}{60} = \frac{3}{6} = \frac{1}{2} = 50\%$ The grocer sold 50% of his stock of coffee.
--	--

Fred had \$.64. He spent \$.40 for his lunch. What per cent of his money did he spend for lunch?

$$\frac{40}{64} = \frac{5}{8} = 62\frac{1}{2}\%$$

Can you prove the answer to this example? How would you do so?

Mother had a bag of sugar weighing 25 lb. She used 19 lb. in making jelly. What per cent of the 25 lb. did she use?

$\frac{19}{25}$ of the sugar was used.	
Check: 25	$\frac{.76}{25} 19.00$
$\frac{.76}{150}$	$\frac{175}{150}$
$\frac{175}{19.00}$	$\frac{150}{150}$
76% of 25 lb. = 19 lb.	

To find what per cent one number is of another, first find what fractional part it is. Then change the common fraction to a decimal and the decimal to a per cent.

(a)

1. 12 is what part of 36?

2. 12 is what part of 8?

3. 30 is what part of 90?

4. 12 is what per cent of 18?

5. 8 is what per cent of 24?

6. 100 is ____% of 20.

7. 36 is ____% of 24.

(b)

What per cent of 36?

What per cent of 8?

What per cent of 90?

25 is what per cent of 15?

60 is what per cent of 48?

30 is ____% of 100.

16 is ____% of 12.

* An article which cost \$.24 was sold for \$.36. What was the per cent increase in price?

$$$.36 - $.24 = $.12 \text{ increase in price}$$

$$\frac{.12}{.24} = \frac{1}{2} = .50 = 50\% \text{ increase in price}$$

*8. A book which cost \$.48 was sold for \$.60. What was the per cent increase in price?

*9. Find the per cent increase in price for the following:

	<i>Cost</i>	<i>Selling Price</i>		<i>Cost</i>	<i>Selling Price</i>
(a)	\$.36	\$.40	(c)	\$5.00	\$5.50
(b)	\$.18	\$.27	(d)	\$.72	\$.80

49. Problems in Percentage

Without pencil.

1. If Charles works 8 out of 10 examples correctly, his paper should be marked ____%.

2. A spelling test contained 12 words. Jane misspelled 4. What per cent of the words in the test did she misspell?

3. Of a total of 15 examples in decimals, Fred worked 12 correctly. What per cent of the examples did he work correctly?

4. A boy had \$.50. He spent \$.20 for school supplies and the remainder of his money for lunch. What per cent of his money did he spend for his lunch?

5. (a) What per cent of 25 is 20? (b) 15 is what per cent of 20?

Use pencil if needed.

*6. An article which cost \$4.50 was sold for \$6.30. What was the per cent of gain?

7. Mr. Brown's income is \$7500 per year. If he pays \$1800 per year for rent, (a) what fractional part of his income does he spend for rent? (b) What per cent of his income does he spend for rent? (c) What amount of rent does he pay per month?

8. A merchant sold at \$72 each coats which cost him \$54 each. What per cent did he gain on each coat?

9. Out of 120 times at bat, a player made 45 hits. What was his batting average?

10. In a certain number of games, a left fielder accepted 32 chances out of 36. What per cent of chances did he accept?

11. A club grew in membership from 180 to 200. What was the per cent of gain in membership?

*12. Another club decreased in membership from 360 to 315. What was the per cent of loss in membership?

13. On a salary of \$1800 per year, Fred White saves \$360. What per cent of his salary does he save?

14. A farm of 320 A. has 120 A. in pasture. What per cent of the farm is in pasture?

15. Mr. Chase's salary was \$2400. If it was increased to \$2616, what was the per cent of increase?

16. Class 7A has a register of 45 pupils. Last week, the following numbers of pupils passed morning inspection: Monday, 36; Tuesday, 40; Wednesday, 42; Thursday, 35; Friday, 45. What per cent of the class passed morning inspection on each of the five days?

*17. In 1925 the population of a town was 8050. In 1929 it was 6440. What was the per cent of decrease in population between 1925 and 1929?

18. A newsboy sold 108 of his 120 papers. What per cent of his papers did he sell?

19. In September a class register was 45 pupils; in June it was 54 pupils. What was the per cent of increase?

50. Finding a Number When a Per Cent Is Given

If 4 pairs of gloves cost \$6.00, what will 5 pairs cost?

4 pairs cost \$6.00

1 pair costs $\frac{1}{4}$ of \$6.00, or \$1.50

5 pairs cost $5 \times \$1.50$, or \$7.50

If $\frac{4}{5}$ of a sum of money equals \$6.00, what is the entire sum of money?

$$\frac{4}{5} \text{ of the money} = \$6.00$$

$$\frac{1}{5} \text{ of the money} = \frac{1}{4} \times \frac{\$1.50}{\cancel{\$6.00}} = \$1.50$$

$$\frac{5}{5} \text{ of the money} = 5 \times \$1.50 = \$7.50$$

$$\text{Check: } \frac{4}{5} \times \frac{\$1.50}{\cancel{\$7.50}} = \$6.00$$

If 80% of a sum of money equals \$6.00, what is the entire sum of money?

$$A. \quad 80\% = .80 = \frac{80}{100} = \frac{4}{5}$$

$$\frac{4}{5} \text{ of the sum} = \$6.00$$

$$\frac{1}{5} \text{ of the sum} = \frac{1}{4} \times \$6.00 = \$1.50$$

$$\frac{5}{5} \text{ of the sum} = 5 \times \$1.50 = \$7.50$$

$$\text{Check: } \frac{4}{5} \times \frac{\$1.50}{\cancel{\$7.50}} = \$6.00$$

$$B. \quad 80\% = .80 = \frac{80}{100}$$

$$\frac{80}{100} \text{ of the sum} = \$6.00$$

$$\frac{1}{100} \text{ of the sum} = \frac{1}{80} \times \$6.00 = \$0.075$$

$$\frac{100}{100} \text{ of the sum} = 100 \times \$0.075 = \$7.50$$

$$\text{Check: } 80\% \text{ of } \$7.50 = \$6.00$$

To find a number when a per cent is given:
(1) change the per cent to a common fraction and solve; or (2) find 1% of the number given and then multiply 1% of the number by 100 to obtain 100% of the number.

Use pencil when needed.

Complete the following:

1. (a) 25% of ? = 18 (d) $16\frac{2}{3}\%$ of ? = \$3.60
 (b) 10% of ? = \$1.75 (e) $66\frac{2}{3}\%$ of ? = \$1.44
 (c) 50% of ? = \$.96 (f) $87\frac{1}{2}\%$ of ? = \$12.60
2. (a) 720 bu. = 80 % of ? (c) \$6.48 = $37\frac{1}{2}\%$ of ?
 (b) 85 bu. = $62\frac{1}{2}\%$ of ? (d) 3960 = 75 % of ?

51. Problem Review

Without pencil.

1. Mary had \$.40 in her purse. This was 25% of what Jane had. How much money had Jane?

2. Frances spent \$1.50 for a pair of gloves. This was 50% of the amount of money which Uncle Frank had given her as a birthday gift. Uncle Frank gave Frances \$ ____.

3. \$21 is what per cent of \$84?

4. A school team won 5 games out of the 8 it played. The team won ____% of the games it played.

5. A dealer bought balls at \$.25 each and sold them for \$.30 each. What per cent of the cost did he gain?

*6. A book that cost \$2.50 was sold for \$2.00. What was the per cent of loss?

With pencil.

7. If 9% of a number is 135, what is the number?
8. Find the number of which 210 is 7%.
9. If 12% of a number is 240, what is the number?
10. \$17 is 25% of \$_____.
11. What is the cost of a plot of ground if 15% of the cost is \$300?
12. \$210 is what part of \$240?
- *13. Mr. Stevens bought a piano for \$750. He paid \$450 to the dealer at the time of purchase. (a) What per cent of the purchase price did he pay? (b) How much money was still due? (c) What per cent of the purchase price was still due?
14. If 18% of the number of girls in the Bryant School is 556, how many girls are there in the school?
15. 434 is 63% of _____.
16. If \$85 is $62\frac{1}{2}\%$ of the cost of a sofa, what is the cost of the sofa?
17. A salesman is obliged to travel 360 mi. from one city to another. After he has traveled 270 mi., what per cent of the total distance has he still to travel?
- *18. A house that cost \$5000 was sold for \$4750. Find the per cent of loss.
19. Jane received \$15 as a birthday gift. She spent \$7.50 for shoes and \$5.00 for a new hat. (a) What per cent of the \$15 was spent for the shoes? (b) For the hat? (c) How much money was left? (d) What per cent of the \$15 was left?
20. The weekly salaries of certain clerks in the Boston Store for two years were as follows. Find the per cent of increase or decrease in salary in each case:

Clerk	First Year	Second Year	Clerk	First Year	Second Year
A	\$16	\$18	F	\$7.50	\$10.00
B	\$25	\$30	G	\$22.50	\$25.00
C	\$35	\$30	H	\$12.50	\$10.00
D	\$45	\$55	I	\$20.00	\$40.00
E	\$25	\$24	J	\$15.00	\$20.00

52. Completion Exercise

Fill in blank spaces with reasonable numbers. Then solve each problem:

1. The Johnsons lived in an apartment on M Street from January 1 to September 30 and paid a monthly rental of \$75. On October 1 they moved into a new apartment on J Street, paying _____% more rent per month. What was their average rent per month for the year?

2. An article bought for \$_____ was sold for \$_____. What was the per cent of gain?

3. Edward earned \$18 a week and saved \$_____ each week. What per cent of his salary did he save?

4. John earns \$22 per week and saves _____% of it. How much money does he save each week?

5. The population of a certain town was 14,500 in 1919. Ten years later it had increased by _____%. What was the population of the town in 1929?

6. An article which cost \$8.50 was sold at a loss of _____%. For what price was the article sold?

7. Mr. Charleton drove his automobile 191.25 mi. in 7.5 hr. What was his average speed per hour?

8. At another time Mr. Charleton drove for 6.25 hr. at the rate of 21.3 mi. per hour. How many miles did he cover?

53. Per Cents Less Than One Per Cent

Mr. Frazer sold \$3600 worth of merchandise at $\frac{1}{2}\%$ commission. How much money did he receive?

$$1\% \text{ of } \$3600 = \$36.00 \qquad \frac{1}{2}\% \text{ of } \$3600 = \frac{1}{2} \text{ of } \$36 = \$18$$

Occasionally you will be called upon to deal with per cents *less* than 1%. These small per cents will cause trouble and confusion unless you are careful.

What is $\frac{1}{4}\%$ of 848?

$$\text{Think: } 1\% \text{ of } 848 = 8.48$$

$$\frac{1}{4}\% \text{ of } 848 = \frac{1}{4} \times \frac{2.12}{\cancel{8.48}} = 2.12$$

1. Find:

(a) $\frac{1}{2}\%$ of 96

(d) $\frac{1}{3}\%$ of 753

(b) $\frac{1}{4}\%$ of 728

(e) $\frac{1}{5}\%$ of 1250

(c) $\frac{1}{2}\%$ of \$262

(f) $\frac{1}{8}\%$ of 144

*At $\frac{3}{4}\%$ commission, what will an agent receive on sales amounting to \$4880?

$$\text{Think: } 1\% \text{ of } \$4880 = \$48.80$$

$$\frac{3}{4}\% \text{ of } \$4880 = \frac{3}{4} \times \frac{\$12.20}{\cancel{\$48.80}} = \$36.60$$

2. Find:

- | | |
|------------------------------|-------------------------------|
| (a) $\frac{3}{4}\%$ of 968 | (e) $\frac{3}{8}\%$ of 5280 |
| (b) $\frac{2}{3}\%$ of \$780 | (f) $\frac{4}{5}\%$ of \$2550 |
| (c) $\frac{2}{5}\%$ of 655 | (g) $\frac{5}{8}\%$ of 1720 |
| (d) $\frac{7}{8}\%$ of 144 | (h) $\frac{5}{6}\%$ of \$960 |

3. At $\frac{2}{3}\%$ commission, what will an agent receive on sales amounting to \$6930?

4. A commission merchant charges $\frac{3}{8}\%$ for his services. What will be his commission if he sells \$7200 worth of goods?

5. The United States levies a tax of $\frac{1}{2}\%$ on certain classes of income. At this rate, what would be the amount of the tax on \$300?

6. The commission on sales amounting to \$540, at $\frac{4}{5}\%$, is —.

54. Sentences for Completion

Complete the following sentences:

1. To find 12% of a number, we _____ the number by _____.

2. 12% of \$200 is $.12 \times$ _____.

3. 25% of 24 is _____ $\times$ _____.

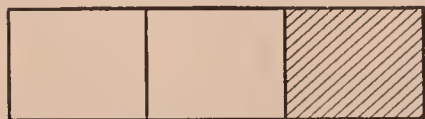
4. 18 is _____% of 24.

5. If 16 is 25% of a number, the number is _____.

6. 16 is 50% of _____.

7. $12\frac{1}{2}\%$ = the common fraction _____.

8.

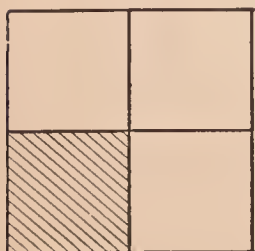
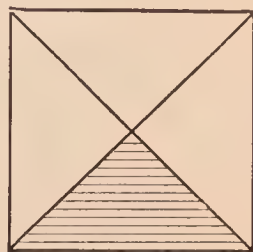
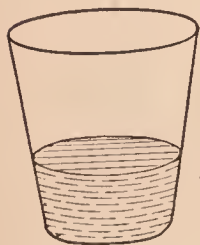
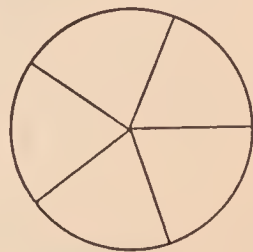


_____ % of this rectangle is shaded.



_____ % of this rectangle is unshaded.

9. $\frac{1}{3}$ of a number equals ____% of the number.
10. (a) One way of finding $37\frac{1}{2}\%$ of a number is to ____ the number by ____.
- (b) Another way to find $37\frac{1}{2}\%$ of a number is to find ____ of the number.
11. .35 of a number is the same as ____% of the number.
12. .625 is the same as ____%.
13. 50% of a number is just ____ as large as the number itself.
- *14. 25% of 36 is just half as much as ____% of 36.
15. Written as a common fraction, 45% would have ____ as its numerator and ____ as its denominator.
16. Each portion of this circle represents ____% of the circle.
17. This tumbler appears to be about ____ full of water.
18. ____% of a number equals the number itself.
19. ____% of this square has been left unshaded.
20. ____% of this square has been shaded.
21. Draw a line 6 in. long. A line 50% as long will measure ____ in.
22. Draw a rectangle. Shade 75% of it.
23. Draw a circle. Shade 75% of it.



55. Estimating

1. 23% of any number is nearly 25% of the number, or about $\frac{1}{4}$ of the number.
2. 23% of 48 is about ____.
3. 52% of a number is nearly $\frac{1}{2}$ of the number.
4. 73% of a number is nearly $\frac{3}{4}$ of the number.
5. 48% of \$30 is about \$____.
6. 22% of \$120 is about $\frac{1}{4}$ of \$120, or \$____.
7. 52% of \$120 is about ? of \$120, or \$____.
8. Is 73% of \$120 more or less than $\frac{3}{4}$ of \$120? Why?
9. 32% of a number is nearly $\frac{1}{3}$ of the number.
10. 32% of \$60 is about \$____.
11. Is 65% of \$96 more or less than $\frac{2}{3}$ of \$96? Can you prove your answer?

56. Review of Percentage

Complete the following:

1. (a) 50% of 126 = ____ (e) $33\frac{1}{3}\%$ of 369 = ____
 (b) 25% of 240 = ____ (f) $37\frac{1}{2}\%$ of 56 = ____
 (c) 20% of 160 = ____ (g) $66\frac{2}{3}\%$ of 189 = ____
 (d) $12\frac{1}{2}\%$ of 248 = ____ (h) 40% of 800 = ____
2. (a) 63 is ____% of 126 (e) 369 is ____% of 1107
 (b) 80 is ____% of 640 (f) 84 is ____% of 224
 (c) 64 is ____% of 320 (g) 504 is ____% of 756
 (d) 93 is ____% of 744 (h) 320 is ____% of 800
3. (a) 63 is 50% of ____ (e) 35 is $33\frac{1}{3}\%$ of ____
 (b) 64 is 25% of ____ (f) 96 is $37\frac{1}{2}\%$ of ____
 (c) 97 is 20% of ____ (g) 144 is $66\frac{2}{3}\%$ of ____
 (d) 75 is $12\frac{1}{2}\%$ of ____ (h) 320 is 40% of ____

57. Percentage Race

Compete row against row. Work quickly but accurately.

Work for 30 minutes. Find the average number right for each row. The row with the highest average wins.

A

1. 12% of \$1800 = ?
2. $4\frac{1}{2}\%$ of 625 = ?
3. ? ft. = $87\frac{1}{2}\%$ of a mile.
4. What is 125% of 1600?
5. What per cent of 24 is 18?
6. 1760 ft. = ? % of a mile.
7. $62\frac{1}{2}\%$ of ? = \$75.
8. ? = $8\frac{1}{4}\%$ of 600.
9. Find 18% of \$2400.
10. 45 min. = ? % of an hour.
11. What is $37\frac{1}{2}\%$ of 1760 yd.?
12. \$800 + 4% of \$800 = ?
13. 250 lb. = ? % of a ton.
14. $5\frac{1}{2}\%$ of 725 = ?
15. ? = 4% of 375 yd.
16. 75 = ? % of 150.
17. 200% of 1 mile = ? ft.
18. $66\frac{2}{3}\%$ of ? = \$900.
19. What per cent of 15 is 9?
20. $37\frac{1}{2}\%$ of ? = 240.
21. 225% of 1500 = ?
22. ? % of 72 is 64.
23. \$1200 - 25% of \$1200 = ?
24. $62\frac{1}{2}\%$ of ? = 750.
25. 24 in. = ? % of a yard.

B

- Find $62\frac{1}{2}\%$ of 6456.
 ? = $5\frac{3}{4}\%$ of 850.
 75% of \$25,000 = ?
 \$50 = ? % of \$300.
 $12\frac{1}{2}\%$ of 1 yd. = ? in.
 250% of \$3600 = ?
 125 = ? % of 500.
 1200 = 80% of ?
 $2400 - 15\%$ of 2400 = ?
 $1\frac{1}{4}\%$ of \$1000 = ?
 What is 8% of 750 ft.?
 1 pint = ? % of a gallon.
 ? = 175% of 850.
 $112\frac{1}{2}\%$ of 6372 = ?
 ? % of 1200 is 400.
 \$1800 + 200% of \$1800 = ?
 15% of 382 = ?
 What per cent of 50 is 48?
 375 ft. = 50% of ?
 $8650 + 80\%$ of 8650 = ?
 240 = $33\frac{1}{3}\%$ of ?
 \$1800 - $33\frac{1}{3}\%$ of \$1800 = ?
 What per cent of 1 sq. ft. =
 72 sq. in.?
 375 = 60% of ?
 300% of \$75 = ?

58. Step-by-Step Test Drill — Percentage

	A	B	C	D	E
1.	6% of 5286 =	4% of 8927 =	7% of 6852 =	8% of 9269 =	5% of 6728 =
2.	15% of \$607.25 =	82% of \$930.74 =	48% of \$605.43 =	56% of \$820.96 =	38% of \$904.56 =
3.	4 $\frac{1}{4}$ % of 8265 =	5 $\frac{1}{2}$ % of 1600 =	3 $\frac{1}{4}$ % of 9260 =	8 $\frac{3}{4}$ % of 6400 =	4 $\frac{1}{2}$ % of 8640 =
4.	500% of 2693 =	300% of 8496 =	200% of 8375 =	600% of 2987 =	800% of 8462 =
5.	87 $\frac{1}{2}$ % of \$20.56 =	66 $\frac{2}{3}$ % of \$64.50 =	80% of \$81.60 =	83 $\frac{1}{3}$ % of \$68.22 =	60% of \$29.85 =
6.	150% of 2846 =	125% of 8268 =	275% of 3740 =	133 $\frac{1}{3}$ % of 6075 =	112 $\frac{1}{2}$ % of 5648 =
7.	115% of \$54.42 =	137% of \$1800 =	164% of \$2400 =	218% of 6250 =	142% of 8450 =
8.	$\frac{175}{25} = ?$ %	$\frac{81}{36} = ?$ %	$\frac{96}{50} = ?$ %	$\frac{175}{50} = ?$ %	$\frac{112}{100} = ?$ %
9.	300 = ? % of 500	175 = ? % of 350	75 = ? % of 175	84 is ? % of 100	65 is ? % of 150
10.	1% of ? = 325	10% of ? = 450	20% of ? = 625	8 $\frac{1}{3}$ % of ? = 8648	16 $\frac{2}{3}$ % of ? = 1500
11.	37 $\frac{1}{2}$ % of ? = \$32.40	40% of ? = \$86.50	62 $\frac{1}{2}$ % of ? = \$82.30	75% of ? = \$27.24	70% of ? = \$49.56

59. Finding a Part of a Number

Mr. Brown earns \$2400 a year. (a) If he spends $\frac{3}{4}$ of his salary, how much does he spend? (b) If he spends .75 of his salary, how much does he spend? (c) If he spends 75% of his salary, how much does he spend?

A. $\frac{3}{4}$ of his salary = \$2400 $\frac{1}{4}$ of \$2400 = \$600 $\frac{3}{4} = 3 \times \$600 = \1800 He spent \$1800.	B. .75 = $\frac{3}{4}$ $\frac{3}{4} \times \frac{\$600}{\cancel{\$2400}} = \1800 He spent \$1800.	C. 75% = .75 = $\frac{3}{4}$ $\frac{3}{4} \times \frac{\$600}{\cancel{\$2400}} = \1800 He spent \$1800.
---	--	--

When a decimal or per cent in a problem can be changed to a common business fraction, change it to the fraction and use the fraction in finding the part of the number.

Problem C is called the first case in percentage.

Find:

- | | | |
|---|------------------------------|------------------------------|
| (a) | (b) | (c) |
| 1. $\frac{3}{7}$ of 56.63 | .75 of \$6400 | 25% of 18,246 |
| 2. $\frac{5}{9}$ of 55.80 | .875 of 7256 lb. | 50% of 62,980 |
| 3. $\frac{1\frac{1}{2}}{1\frac{1}{2}}$ of 144.72 | .83 $\frac{1}{3}$ of \$30.54 | 62 $\frac{1}{2}$ % of 83,246 |
| 4. $\frac{5}{6}$ of 43.80 | .66 $\frac{2}{3}$ of 6294 T. | 16 $\frac{2}{3}$ % of 54,936 |
| 5. $\frac{7}{8}$ of 67.20 | .375 of 3680 ft. | 33 $\frac{1}{3}$ % of 82,965 |
| 6. How many feet are there in .375 of a mile? | | |
| 7. How many square inches are there in .75 sq. ft.? | | |
| 8. How many square feet are there in .50 sq. yd.? | | |

9. How many pounds are there in .25 of a ton?
10. What is $66\frac{2}{3}\%$ of 3672 bu.?
11. A house bought for \$16,000 was sold at a gain of $12\frac{1}{2}\%$. What was the selling price?
12. The distance by automobile between Rockland and Portland is 84.8 mi. When Fred had traveled 75% of the distance, a tire blew out. How many miles remained to be traveled?
13. A man with an annual income of \$3600 saves 20% of it. How much does he save?

60. Finding What Part One Number Is of Another

A farmer raised 1500 bu. of wheat. He sold 1000 bu.
 (a) What part of his crop did he sell? (b) How many hundredths of his crop did he sell? (c) What per cent of his crop did he sell?

A. $\frac{1000}{1500} = \frac{2}{3}$ He sold $\frac{2}{3}$ of his crop.	B. $\frac{1000}{1500} = \frac{2}{3}$ $\frac{2}{3} = .66\frac{2}{3}$ He sold $.66\frac{2}{3}$ of his crop.	C. $\frac{1000}{1500} = \frac{2}{3}$ $\frac{2}{3} = .66\frac{2}{3} = 66\frac{2}{3}\%$ He sold $66\frac{2}{3}\%$ of his crop.
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To find what part one number is of another, express the relationship as a common fraction in its lowest terms, using as the denominator the number of which the part is taken.

To find what per cent one number is of another, reduce the fraction to its decimal equivalent and then to a per cent.

Problem C is called the **second case in percentage**.

Complete the following by supplying in (a) the missing fractional part; in (b) the missing decimal part; and in (c) the missing per cent:

- | (a) | (b) | (c) |
|------------------------------------|----------------|----------------|
| 1. 800 is ? of 3000 | 86 is ? of 150 | 20 is ? of 125 |
| 2. ? of 2500 is 1800 | ? of 75 is 30 | 60 is ? of 160 |
| 3. ? of 2600 is 1300 | 21 is ? of 84 | ? of 45 is 30 |
| 4. 250 is ? of 3250 | 86 is ? of 172 | ? of 64 is 16 |
| 5. 300 is ? of 1800 | ? of 78 is 39 | 45 is ? of 75 |
| 6. 146 is ? of 150 | ? of 75 is 20 | 58 is ? of 464 |
| 7. What decimal part of 48 is 24? | | |
| 8. What decimal part of 177 is 59? | | |
| 9. What decimal part of 96 is 32? | | |
| 10. What decimal part of 75 is 15? | | |

Complete the following:

- | | |
|-------------------------|----------------------------|
| 11. 800 is ? % of 600 | 16. \$500 is ? % of \$1000 |
| 12. 900 is ? % of 400 | 17. \$2500 is ? % of \$250 |
| 13. 1200 is ? % of 400 | 18. \$700 is ? % of \$350 |
| 14. 1600 is ? % of 800 | 19. \$150 is ? % of \$100 |
| 15. 1500 is ? % of 1200 | 20. \$75 is ? % of \$60 |

61. Problems

1. One pint is what per cent of a gallon?
2. One inch is what per cent of a foot?
3. Mr. Abbot ordered 12 T. of coal for the winter. After two months he had used 4 T. What per cent of the coal had he used?
4. The following table shows the price per ton of hard and soft coal from 1900 to 1925:

<i>Year</i>	<i>Hard Coal</i>	<i>Soft Coal</i>	<i>Year</i>	<i>Hard Coal</i>	<i>Soft Coal</i>
1900	\$4.26	\$2.26	1915	\$5.27	\$2.53
1905	\$4.99	\$2.63	1920	\$9.44	\$8.85
1910	\$4.94	\$2.49	1925	\$11.19	\$4.39

(a) Find the difference between the 1900 and 1925 prices of hard coal. What was the per cent of increase? (Two decimal places.)

(b) Find the difference between the 1900 and 1925 prices of soft coal. What was the per cent of increase? (Two places.)

(c) Which kind of coal shows the greater per cent of increase? How much greater is it?

5. Compare the 1900 with the 1920 prices. Which kind of coal showed the greater per cent of increase? How much greater was it?

6. Make up a problem in percentage using the information in the table.

62. Finding a Number When a Part Is Given

Sarah saves \$4 each week. How much does she earn if this is (a) $\frac{2}{5}$ of what she earns; (b) .4 of what she earns; (c) 40% of what she earns?

A. $\frac{2}{5}$ of her earnings = \$4 $\frac{1}{5} = \\$4 \div 2$ or $\frac{1}{2}$ of \$4 = \$2 $\frac{5}{5} = 5 \times \\$2 = \\$10$	B. Change .4 to $\frac{2}{5}$ and solve as in A. C. Change 40% to $\frac{2}{5}$ and solve as in A.
---	--

Problem C is called the **third case in percentage**.

Find the number of which

- | (a) | (b) | (c) |
|--------------------------|-------------------------|--------------------------|
| 1. 18 is $\frac{3}{4}$ | 24 is .2 | 39 is 60% |
| 2. 25 is $\frac{5}{9}$ | 75 is .375 | 129 is $66\frac{2}{3}\%$ |
| 3. 600 is $\frac{2}{3}$ | 120 is .75 | 650 is $62\frac{1}{2}\%$ |
| 4. 2400 is $\frac{3}{8}$ | 150 is $.66\frac{2}{3}$ | 910 is 70% |
| 5. 1800 is $\frac{6}{7}$ | 721 is $.87\frac{1}{2}$ | 570 is 30% |
6. Mr. Wright sold 322 bu. of wheat. This was $33\frac{1}{3}\%$ of his crop. How many bushels did he raise?
7. Forty-two children in a class were promoted. This was $87\frac{1}{2}\%$ of the register. What was the register?
8. Mr. Ward drove his automobile 120 mi. one day. This was 40% of the distance he planned to go. How many miles did he intend to travel?
9. Mr. Bates sold 350 bu. of potatoes. This was $83\frac{1}{3}\%$ of his crop. What did his crop amount to?
10. Mrs. Reed saves \$1500 a year. This is $37\frac{1}{2}\%$ of her income. What is her income?
11. A man rented a house for \$900 a year. This amounted to .15 of the cost of the house. What did the house cost?
12. Mr. Willis sold an automobile for \$1800. This was $66\frac{2}{3}\%$ of the cost. What was the cost of the car?

63. Reduction of Denominate Numbers

Denominate numbers expressed in different units must be changed to the same unit before a problem can be solved. Sometimes they must be reduced to a higher unit, sometimes to a lower unit, and sometimes to a fractional part of a larger unit.

Fred's height is 58 in. Express his height in feet and inches.

$$1 \text{ ft.} = 12 \text{ in.} \quad 58 \text{ in.} \div 12 = 4 \text{ ft. } 10 \text{ in.}$$

Find the cost of 5 yd. 2 ft. of fence wire @ \$.15 a foot.

$$\begin{aligned} 5 \text{ yd.} &= 5 \times 3 \text{ ft.} = 15 \text{ ft.} & 15 \text{ ft.} + 2 \text{ ft.} &= 17 \text{ ft.} \\ 17 \times \$.15 &= \$2.55 \end{aligned}$$

Find the area of a plot of ground 12 ft. wide and 18 ft. 8 in. long.

$$18 \text{ ft. } 8 \text{ in.} = 18\frac{2}{3} \text{ ft.} \quad 12 \text{ ft.} \times 18\frac{2}{3} \text{ ft.} = 224 \text{ sq. ft.}$$

- | | |
|------------------------------------|------------------------------------|
| 1. 9 ft. 7 in. = ____ in. | 14. 32 in. = ____ yd. |
| 2. ____ min. = 1 hr. 45 min. | 15. 27 in. = ____ yd. |
| 3. ____ oz. = 1 lb. 4 oz. | 16. 1 yr. 8 mo. = ____ yr. |
| 4. 1 doz. + 5 = ____ units | 17. 2 yr. 6 mo. = ____ yr. |
| 5. $24\frac{1}{2}$ hr. = ____ min. | 18. 3 yr. 4 mo. = ____ yr. |
| 6. $1\frac{1}{2}$ mi. = ____ ft. | 19. 45 min. = ____ hr. |
| 7. 80 min. = ____ hr. ____ min. | 20. $2\frac{1}{2}$ hr. = ____ min. |
| 8. 75 in. = ____ ft. ____ in. | 21. 1 yr. 8 mo. = ____ mo. |
| 9. 16 wk. = ____ mo. | 22. 96 hr. = ____ da. |
| 10. 24 mo. = ____ yr. | 23. 27 sq. ft. = ____ sq. yd. |
| 11. 20 dimes = \$ ____ | 24. 104 wk. = ____ da. |
| 12. 55 pt. = ____ qt. | 25. 5 yd. 18 in. = ____ yd. |
| 13. 54 in. = ____ yd. | 26. 1 yr. 2 mo. = ____ yr. |

64. Liquid Measure

$$4 \text{ gi.} = 1 \text{ pt.}$$

$$2 \text{ pt.} = 1 \text{ qt.}$$

$$4 \text{ qt.} = 1 \text{ gal.}$$

How much milk do you drink each day?

Gasoline is sold by the ____.

We generally buy cream in $\frac{1}{2}$ ____ bottles.

Supply the missing numbers:

1. 8 gal. = ____ pt.

4. 14 qt. = ____ gal.

2. ____ pt. = 4 qt.

5. 9 pt. = ____ qt.

3. 1 qt. = ____ gi.

6. ____ gal. = 17 qt.

Use pencil if needed.

7. Harold had a lemonade stand at the fair. He made 3 gal. for 30¢ a gallon. He sold it in half-pint glasses at 5¢ a glass. What was his profit?

8. How many half-pint bottles of cream can be filled from a 2-quart can?

9. At 9¢ a pint, what will a gallon cost?

10. Mrs. Jones uses 2 qt. of milk daily. How many gallons does she use in a week?

11. Miss Stevens ordered 64 half-pint bottles of milk for the pupils in her class. How many quarts did this equal?

12. Mrs. Walters orders a quart of milk a day for each of her two children and a pint for each of the three adults in the family. How many quarts are used in this family each day?

13. At 28¢ a half-pint, what will a quart of cream cost?

66. Measures of Time

$$60 \text{ sec.} = 1 \text{ min.}$$

$$4 \text{ wk.} = 1 \text{ mo.}$$

$$60 \text{ min.} = 1 \text{ hr.}$$

$$12 \text{ mo.} = 1 \text{ yr.}$$

$$24 \text{ hr.} = 1 \text{ da.}$$

$$100 \text{ yr.} = 1 \text{ century}$$

$$7 \text{ da.} = 1 \text{ wk.}$$

$$365 \text{ da.} = 1 \text{ common year}$$

$$366 \text{ da.} = 1 \text{ leap year}$$

Leap years are the years which can be divided by 4 without a remainder, except the century years. Century years are leap years if they can be divided by 400 without a remainder.

Is 1930 a leap year? Why?

When will the next leap year come?

Without pencil.

1. John reached the station at 12.35 to get a 12.20 train. How many minutes late was he?

2. Jane was in the movies for 90 min. How many hours was she there?

3. How many days are there between Lincoln's and Washington's birthdays?

4. A 5-hour school day will mean ____ minutes a day and ____ minutes a week.

5. Anna sleeps 8 hr. a day. What part of a day does she sleep?

6. A commuter spends 45 min. on the train morning and evening. How many hours is he on the train (a) each day? (b) Each week?

7. Mrs. Franklin borrowed \$2000 on May 1 and paid it back on September 1. What was the interest period?

67. Square Measure

$$144 \text{ sq. in.} = 1 \text{ sq. ft.}$$

$$9 \text{ sq. ft.} = 1 \text{ sq. yd.}$$

$$30\frac{1}{2} \text{ sq. yd.} = 1 \text{ sq. rd.}$$

$$160 \text{ sq. rd.} = 1 \text{ A.}$$

What unit would you use in estimating the floor space of the classroom? The amount of floor space covered by a rug? The size of a farm?

Without pencil.

Supply the missing numbers:

$$1. \frac{3}{4} \text{ A.} = \text{ ______ } \text{ sq. rd.}$$

$$4. \frac{1}{2} \text{ sq. yd.} = \text{ ______ } \text{ sq. ft.}$$

$$2. 3 \text{ A.} = \text{ ______ } \text{ sq. rd.}$$

$$5. 2 \text{ sq. ft.} = \text{ ______ } \text{ sq. in.}$$

$$3. 3 \text{ sq. rd.} = \text{ ______ } \text{ sq. yd.}$$

$$6. 72 \text{ sq. in.} = \text{ ______ } \text{ sq. ft.}$$

With pencil.

7. (a) How many square feet of blackboard are there in your classroom? (b) What would be its cost at 28¢ a square foot?

8. (a) What is the amount of floor space in your classroom? (b) Divide by the register of your class and find how much is allowed for each pupil.

9. Some boys at play broke a window with a baseball. They offered to pay for the damages. What must they pay for a piece of glass 3 ft. by 4 ft. at 15¢ a square foot?

10. Mrs. Daniels bought a rug 9 ft. by 12 ft. to cover a floor 12 ft. by 15 ft. How many square feet of floor remained uncovered?

11. The entry to a house measures 5 ft. by 4 ft. Which of these rugs will fit: a rug 6 ft. by 5 ft. or a rug $4\frac{1}{2}$ ft. by $3\frac{1}{2}$ ft.?

68. Measures of Weight

$$16 \text{ oz.} = 1 \text{ lb.}$$

$$100 \text{ lb.} = 1 \text{ cwt.}$$

$$2000 \text{ lb.} = 1 \text{ T.}$$

Without pencil.

1. Coal is supplied by the _____ or _____.
2. My weight is measured in _____ and _____.
3. Butter, tea, coffee, etc., are measured by the _____ or _____.
4. How many ounces are there in $2\frac{3}{4}$ lb.?
5. Find the cost of 1 lb. of sugar at \$25 per hundred-weight.
6. What will 1 lb. of a commodity cost if 100 lb. cost \$7.50?
7. The capacity of a freight car is 36,000 lb. What is the capacity in tons?
8. A notice on a bridge reads, "Limit, 8 tons." What is the limit in pounds?

Use pencil if needed.

9. What is the cost of $\frac{3}{4}$ lb. cinnamon at 10¢ an ounce?
10. At 4 oz. for 15¢, what will $1\frac{1}{2}$ lb. of peanuts cost?
11. How many 8-ounce boxes can be filled from a bag of candy that contains $5\frac{1}{2}$ lb.?
12. A dealer buys coal at \$12 a ton and sells it for \$1 a hundredweight. (a) What is his profit on a ton? (b) What is his per cent profit?
13. A customer ordered 10 T. of coal. The first load brought 3500 lb.; the second, 3500 lb. How many pounds remained to be delivered?

69. Adding Denominate Numbers

Elsie visited her grandmother for the holidays. She spent 1 hr. 40 min. on the train. Then she had a 25-minute ride from the station to the house. How long did it take her to make the trip?

Think: 40 min. + 25 min. = 65 min.
65 min. = 1 hr. and 5 min.
Write 5 in minutes' column.
Add 1 hr. to hours' column. Write 2.

1. A milk dealer delivered 2 qt. 1 pt. of milk to his first customer, 3 qt. to the second, 1 qt. 1 pt. to the third, and 1 pt. to the fourth. How much milk did he deliver to all four customers?

2. How much fence wire is needed to inclose a field 28 ft. 9 in. on one side, 16 ft. 8 in. on the second, 4 ft. 10 in. on the third, and 24 ft. on the fourth side?

- 3.** Frank and Tom earn money by working after school. (a) How many hours did each one work last week? (b) At 50¢ an hour, how much did each one earn?

	<i>Frank</i>	<i>Tom</i>
Monday	1 hr. 30 min.	1 hr. 10 min.
Tuesday	1 hr. 20 min.	45 min.
Friday	1 hr. 15 min.	1 hr.
Saturday	1 hr. 40 min.	1 hr. 50 min.

4. 5 gal. 1 qt. 5. 3 yd. 2 ft. 6. 8 ft. 8 in. 7. 6 lb. 2 oz.
 2 gal. 3 qt. 1 yd. 1 ft. 6 ft. 2 in. 5 lb. 8 oz.
 4 gal. 2 qt. 5 yd. 1 ft. 9 ft. 4 in. 2 lb. 12 oz.

70. Subtracting Denominate Numbers

On his first try at the running broad jump, Allan's record was 8 ft. 6 in. On the second try it was 9 ft. 2 in. What was the gain in distance?

$$\begin{array}{r} 9 \text{ ft. } 2 \text{ in.} \\ 8 \text{ ft. } 6 \text{ in.} \\ \hline 8 \text{ in.} \end{array}$$

6 in. cannot be taken from 2 in.

Think: $2 \text{ in.} + 12 \text{ in. (1 ft.)} = 14 \text{ in.}$

$6 \text{ in.} + 8 \text{ in.} = 14 \text{ in.}$

Write 8 in.

Think: $9 \text{ ft.} + 0 = 9 \text{ ft.}$

In what other way might this subtraction be explained?

1. The record for the standing broad jump in our school was 5 ft. 8 in. Compare the following scores with the record. By how much do they fall short of or exceed it?
(a) 5 ft. 6 in.; (b) 4 ft. 11 in.; (c) 5 ft. 9 in.; (d) 6 ft. 1 in.

2. A train leaving the city at 2.55 reaches Kingston at 5.05. How long does it take the train to make the trip?

3. A crate and its contents weigh 25 lb. 8 oz. The crate weighs 12 lb. 12 oz. The contents weigh ____.

4. George is 10 yr. 4 mo. old. His sister is 8 yr. 5 mo. old. What is the difference in their ages?

5. Find the difference between 8 lb. 10 oz. and 16 lb. 8 oz.

Subtract:

$$\begin{array}{r} 6. \quad 12 \text{ ft. } 5 \text{ in.} \\ \quad 6 \text{ ft. } 7 \text{ in.} \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 9 \text{ yd. } 1 \text{ ft.} \\ \quad 7 \text{ yd. } 2 \text{ ft.} \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 8 \text{ gal. } 1 \text{ qt.} \\ \quad 5 \text{ gal. } 3 \text{ qt.} \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 5 \text{ hr. } 15 \text{ min.} \\ \quad 2 \text{ hr. } 45 \text{ min.} \\ \hline \end{array}$$

***71. Multiplying Denominate Numbers**

Mrs. Cook's milk order is 2 qt. 1 pt. daily. How much milk does she receive in a week?

$$\begin{array}{r} 2 \text{ qt. } 1 \text{ pt.} \\ 7 \\ \hline 17 \text{ qt. } 1 \text{ pt.} \end{array}$$

Think: $7 \times 1 \text{ pt.} = 7 \text{ pt.}$

$7 \text{ pt.} = 3 \text{ qt. } 1 \text{ pt.}$

Write 1 pt. Carry 3 qt.

Think: $7 \times 2 \text{ qt.} = 14 \text{ qt.}$

$14 \text{ qt.} + 3 \text{ qt.} = 17 \text{ qt.}$

Write 17 qt.

1. Mr. Morris travels 1 hr. 40 min. each day. How much does this amount to in 6 days?

2. What is the total weight of 5 cartons if each weighs 2 lb. 5 oz.?

3. What is the distance around a square lot if each side measures 24 ft. 10 in.?

4. How much milk will be delivered to Mrs. Brown in 2 weeks if her daily order is 1 qt. 1 pt.?

5. Anna practices 1 hr. 15 min. a day for 6 days a week. How much time does she spend at the piano?

Multiply:

$$\begin{array}{r} 6. \quad 8 \text{ yd. } 2 \text{ ft.} \\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 12 \text{ ft. } 9 \text{ in.} \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad 3 \text{ lb. } 11 \text{ oz.} \\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 1 \text{ hr. } 10 \text{ min.} \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 5 \text{ gal. } 2 \text{ qt.} \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \quad 1 \text{ sq. yd. } 2 \text{ sq. ft.} \\ 5 \\ \hline \end{array}$$

***72. Dividing Denominate Numbers**

Five packages have a total weight of 12 lb. 3 oz. What is their average weight?

Think: $13 \text{ lb.} \div 5 = 2 \text{ lb.}$ and a remainder of 3 lb.

$$\begin{array}{r} 2 \text{ lb. } 10 \text{ oz.} \\ 5 \overline{)13 \text{ lb. } 2 \text{ oz.}} \end{array}$$

Write 2 lb. over 13 lb.

Think: $3 \text{ lb.} = 48 \text{ oz.}$ $48 \text{ oz.} + 2 \text{ oz.} = 50 \text{ oz.}$

$50 \text{ oz.} \div 5 = 10 \text{ oz.}$

Write 10 oz. over 2 oz.

The average weight is 2 lb. 10 oz.

1. Mary spends 7 hr. 30 min. practicing for 6 days a week. What is the average time per day?

2. Agnes had 5 yd. 2 ft. of ribbon, which she cut into 4 equal lengths. What was the length of each piece?

3. Stand at a given starting point and then take 6 steps. Measure the distance covered. What is the average length of your step?

4. David had three chances at the broad jump. First he jumped 4 ft. 11 in., then 5 ft. 3 in., and then 4 ft. 10 in. What was his average distance?

5. A milkman delivers 17 qt. and 1 pt. of milk to Mrs. Dodd each week. What is the average daily amount that he delivers?

6. $3 \overline{)8 \text{ gal. } 3 \text{ qt.}}$

7. $3 \overline{)19 \text{ ft. } 6 \text{ in.}}$

8. $8 \overline{)17 \text{ lb. } 8 \text{ oz.}}$

9. $7 \overline{)15 \text{ hr. } 45 \text{ min.}}$

10. $4 \overline{)9 \text{ yd. } 2 \text{ ft.}}$

11. $3 \overline{)18 \text{ hr. } 45 \text{ min.}}$

SEVENTH GRADE — PART II

73. Household Problems

Without pencil.

1. Mr. Williams's salary is \$4800 per year. How much does he earn per month?

2. He pays \$50 per month for the rent of his apartment. How much does his rent amount to in a year?

3. (a) What fractional part of his income does he spend for rent? (b) What per cent does he spend?

4. Last winter Mr. Williams bought 6 T. of coal at \$12.50 per ton. The coal cost \$_____.

5. In one month the bills for gas and electricity amounted to \$5.85. The bill for electricity was \$2.55. What was the amount of the bill for gas?

6. The bills for electricity for the year amounted to \$30, the gas bills to \$39, and the telephone bills to \$33. The total amount spent for electricity, gas, and telephone was \$_____.

7. If Mr. Williams allowed $\frac{1}{3}$ of his income for food, (a) how much money would he spend for food in a year? (b) What per cent of his income would be spent for food?

*8. At the end of the year Mr. Williams found that he had spent $\frac{1}{2}$ as much for clothing as for food. How much money did he spend for clothing?

*9. (a) What fractional part of his income did Mr. Williams spend for clothing? (b) This was _____% of his income.

*10. (a) How much money did Mr. Williams spend for the two items, food and clothing? (b) This was _____% of his yearly income.

Use pencil if needed.

11. A man earns \$5040 per year and spends $\frac{1}{6}$ of it for rent. (a) How much does he spend for rent in a year? (b) In a month? (c) What per cent of his income does he spend for rent?

12. Mr. Ford earns \$450 per month. In January he paid $\frac{1}{5}$ of a month's salary for taxes and \$22.50 for insurance. (a) How much money did he pay for taxes? (b) For taxes and insurance together? (c) What per cent of his income was spent for insurance?

13. On August 5, Mr. Ford paid the following bills: gas, \$2.75; electricity, \$1.95; telephone, \$2.25. How much money would he have left from a ten-dollar bill?

14. A man's income is \$4500 per year. He plans to spend $\frac{1}{5}$ of it for food and $\frac{1}{10}$ of it for general expenses. (a) How much money will he spend for food? (b) For general expenses? (c) How much of his salary will be left? (d) What fractional part of his salary will be left? (e) This is ____% of his salary.

***15.** Mr. Ford gives his daughter Mary an allowance of \$.75 per week and his son John an allowance of \$.50 per week. In addition, each child receives \$5 as a birthday gift and \$5 to spend at Christmas time. (a) How much money does Mary receive per year? (b) How much does John receive? (c) Mary receives \$_____ more than John.

With pencil.

16. What is the total cost of the following electrical appliances which Mr. Ford bought for use in his home: toaster, \$7.50; sewing machine, \$45; fan, \$9.95?

17. In October, Mr. Rogers bought 4 T. of coal at \$12.50 per ton; in December, 3 T. at \$12.75 per ton, and in January, 3 T. at \$13.25 per ton. (a) Find the total amount he paid for coal. (b) What was the average cost per ton?

18. What will it cost to install a new hot-water heater in the Ford house if the cost of the separate items is as follows: heater, \$75.90; pipe, $24\frac{1}{2}$ ft. at 22¢ per foot; labor, $8\frac{1}{2}$ hr. at 90¢ per hour.

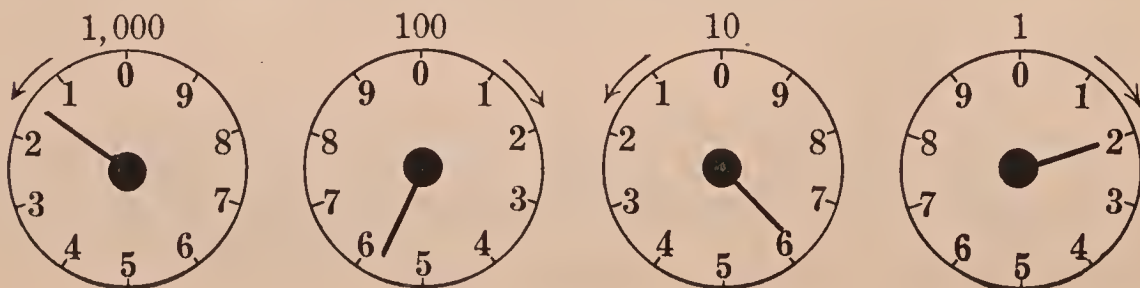
19. In a district where coal is selling at \$12.25 per ton, there is an additional charge of 25¢ per ton for carrying the coal into the cellar. At this rate, what will be the total cost of 12 T. of coal?

20. Mrs. Ford uses $1\frac{3}{4}$ yd. of percale to make an apron. How many aprons could she make from 7 yd. of the material?

21. Find the cost of the following purchases made by Mrs. Williams: $8\frac{1}{2}$ yd. of percale at 32¢ per yard; $3\frac{3}{4}$ yd. of muslin at 28¢ per yard; and $12\frac{3}{8}$ yd. of lace at 16¢ per yard.

74. Paying for Electricity

When the "meter man" came into the Shearer home to "read the meter" on the morning of December 23, Fred went to the cellar with him. The meter looked like this:



(It should be noticed that the numbers on the first and third dials, reading from the right, go clockwise, but that the numbers on the second and fourth dials go in the opposite direction.)

The meter man entered the number 1562 in his book, and Fred made a record of the number also. A few days later Mrs. Shearer received the following bill:

To QUEENS COUNTY LIGHTING CO., Dr. 78 Broadway, Queens, N. Y.					
Nov.	Dec.	Meter Readings		Used K.W.H.	Amount
		Previous	Present		
25	23	1504	1562	58	\$4.06
Mr. J. B. Shearer, 192 Main Ave., Queens, N. Y.					
Received Payment_____ For the Company					
_____ Collector					

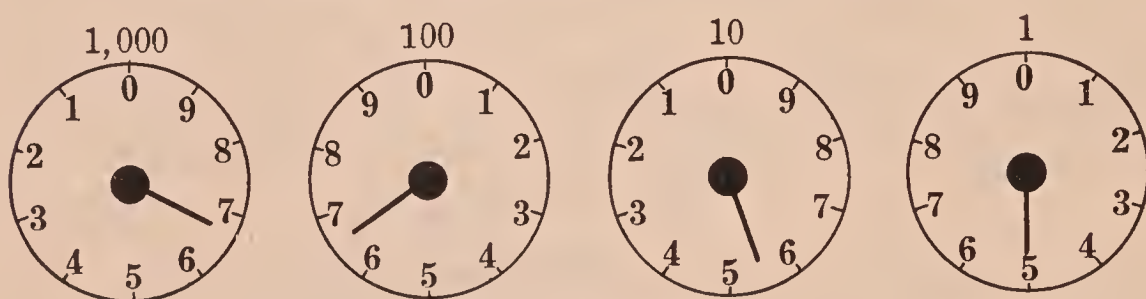
On the back of the bill was the following schedule of monthly rates for electricity:

- First 1000 K.W.H. — 7 ¢ per K.W.H.
- Next 500 K.W.H. — 6 ¢ per K.W.H.
- Next 1500 K.W.H. — 5 ¢ per K.W.H.
- Next 5000 K.W.H. — 4½¢ per K.W.H.
- Excess — 4 ¢ per K.W.H.

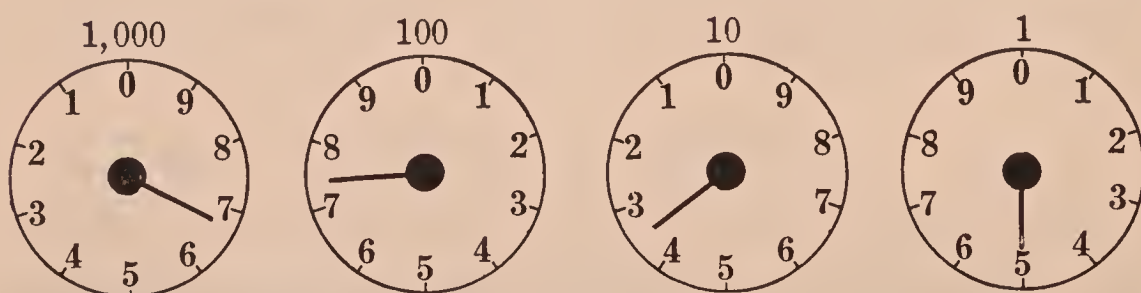
Fred compared the "Present Reading" on the bill with the reading which he made on December 23, and found that the readings agreed. The Shearer family had used 58 K.W.H. of current, at 7¢ per kilowatt hour, since the previous reading on November 25. The amount of the bill was \$4.06. Was that correct?

The amount of electricity used in your home is measured by an electric meter furnished by the company which supplies you with the current. The unit of measurement is the *watt hour*; 1000 watt hours make a *kilowatt hour*. The abbreviation for "kilowatt hour" is K.W.H.

75. How to Read an Electric Meter



JUNE READING



JULY READING

There are several types of meters, but all are read in the same way. The meter has four dials as shown in the diagram. Dial 1 (the right-hand dial) registers kilowatt hours to 10; the next dial to the left registers kilowatt hours by 10's to 100; the third, by 100's to 1000; and the

dial to the extreme left, by 1000's to 10,000. Thus the meter may be read as a four-place number.

When the hand in the first dial has made the circuit from 0 to 0, the hand on the next dial has moved from 0 to 1. The same is true of the other dials. When the dial hand is *between* two numbers, read the smaller number.

The June reading on the meter shown is 6655 K.W.H. What is the July reading? How many K.W.H. of current were used between readings? Find the cost at 7¢ per kilowatt hour.

Notice the "sliding scale" of rates that appeared on the back of the Shearer bill. Why did the Shearers have to pay the highest rate per kilowatt hour?

76. Problems

1. Read the dials below. Compute the amount of current used and the cost at 7¢ per kilowatt hour.



APRIL READING



MAY READING

*2. Draw a set of dials to show a reading of 3986 K.W.H.

3. The January reading of our meter was 6341, and the February reading 6398. At 7¢ per kilowatt hour, how much did we spend for electricity for the month?

4.

Yonkers, N.Y.

Mr. F. J. Spencer
19-93 Broadway

To Westchester Lighting Co., Dr.

Present Reading 4415

Last Reading 4283

Used K.W.H. ? at 7¢ per K.W.H.

Received Payment
for the Company _____

Total \$_____

Collector

5. Bring a bill for electricity from home. Check the bill to see whether it is correct.

6. Read your electric meter today and again a week from today. Compute the amount of current used in your home for the week. What price do you pay per kilowatt hour?

7. One month ago today, our meter read 5560 K.W.H. Now it reads 5985. (a) How much electricity have we used? (b) What will it cost at 8¢ per kilowatt hour?

8. The May reading of our meter was 6854. The June reading was 6903. At 8¢ per kilowatt hour, what did we pay for electricity for May?

77. Paying for Gas



The gas consumed in your home is measured by a meter which shows the number of *cubic feet* of gas used. (Note that, as in the case of the electric meter, the numbers on the second dial go in the opposite direction from those on the other dials.)

Each division of the right-hand dial represents 100 cu. ft. of gas. When the hand on this dial has made a complete circuit, going from 0 to 0, it means that 1000 cu. ft. of gas have been consumed. Meantime the hand on the middle dial has moved from 0 to 1.

Each division on Dial 2 (the middle dial) represents 1000 cu. ft. A complete circuit of the hand on this dial indicates that 10,000 cu. ft. of gas have been registered through the meter.

Can you tell how many cubic feet of gas have passed through the meter when the hand on the left-hand dial has made a complete circuit? The readings on the meter are based on the decimal scale.

When the hand on any dial is *between* two numbers, read the lesser number.

Fred read the Shearer meter on June 30 and again on July 28, each time just after it had been read by the company's reader.

Here are the meter readings:



JUNE READING



JULY READING

Here is a copy of the gas bill which the Shearers received for the month of July:

To CONSOLIDATED GAS CO., Dr.

Mr. J. B. Shearer,
192 Main Ave.,
Queens, N. Y.

Reading Dates		Meter Readings		Gas Used (cu. ft.)	Due
June	July	Present	Previous		
30	28	39,900	38,500	1400	1.61
Received Payment _____				For the Company	
				_____ Collector	

The Shearers pay at the rate of \$1.15 per thousand cubic feet. Fred checked the bill when it came on July 30.

July reading	39,900	1400 = 1.4 M. cu. ft.
June reading	38,500	At \$1.15 per thousand,
Gas consumed	<u>1,400</u> cu. ft.	the cost could be $1.4 \times$ \$1.15, or \$1.61

The cost of gas varies from one place to another, but in most places it is between \$1.10 and \$1.40 per thousand cubic feet (M cu. ft.).

A “sliding scale” of rates is offered by many companies. The cost per thousand cubic feet is least to the largest consumers of gas. Can you tell why?

Study your own gas bill with this point in mind.

78. Problems

- 1. Draw a set of dials to show a reading of 17,500 cu. ft.
- 2. Find the amount of gas consumed in each case:

<i>January 1</i>	<i>February 1</i>	<i>January 1</i>	<i>February 1</i>
(a) 17,500	22,600	(d) 27,300	29,600
(b) 87,300	91,400	(e) 72,700	74,500
(c) 42,100	44,900	(f) 65,900	68,300

- 3. In each case above, find the cost of the gas consumed at \$1.20 per thousand cubic feet.

- 4. Complete the following:

	<i>Present Reading</i>	<i>Previous Reading</i>	<i>Amount Consumed</i>	<i>Rate per Thousand</i>	<i>Amount of Bill</i>
(a)	47,800	44,400	?	\$1.10	?
(b)	44,400	41,500	?	\$1.20	?
(c)	62,500	55,800	?	\$1.15	?
(d)	52,900	50,600	?	\$1.20	?
(e)	55,800	52,900	?	\$1.05	?

5. At \$1.20 per thousand cubic feet, find the cost of gas consumed in a home in which the meter, as shown by the bill, registered as follows: Index, March 1, 34,000 cu. ft.; index, February 1, 28,000 cu. ft.

6. If you use gas in your home, read your own meter at the beginning of two successive months. Compute the amount of gas used. Learn the cost of gas in your locality and compute the cost of the gas used in your home for the month.

79. Thrift

Thrift means more than mere saving. It includes wise management of our affairs and careful use of time and energy, so that some day we may become efficient workers; it includes systematic saving and careful investment and wise expenditure of money; it includes looking ahead and making provision for the future.

Benjamin Franklin has sometimes been called the "Father of Thrift." He learned the value of saving and wise expenditure of money through his own experiences as boy and man. Under the name of "Poor Richard," Franklin wrote many wise sayings, with some of which you are more or less familiar. "A penny saved is a penny earned" is one of these sayings. What did he mean by this?

There are several ways of saving money. Some people set aside a certain sum each week or each month. The money saved should, of course, be wisely invested so that it may earn more money.

To encourage the saving of small amounts, the United States maintains *Postal Savings Banks* in connection with

its post offices. Here you may deposit ten cents at a time. For the ten cents, you receive a stamp affixed to a card. Ten stamps may be exchanged for a certificate or be redeemed for cash. The certificates bear interest at the rate of two per cent per year. The certificates may be exchanged for bonds which draw interest at the rate of two and one-half per cent per year. Through the Postal Savings Banks, many people have been encouraged to save small sums of money which otherwise would have been spent foolishly. Even a small sum of money, saved regularly and invested at compound interest, will soon grow into a sum which will surprise you.

Suppose that you save 5¢ each day for 10 years. At 4% interest, compounded twice a year, your savings of 5¢ daily will amount to \$223.68.

It is also possible to save by *careful buying*. The thrifty housewife, for example, can save money by being careful of her expenditures. Whenever it is possible to do so, she will buy staple supplies in quantity, because by so doing she saves money.

Suppose that soap can be bought at 6¢ a cake or 65¢ a dozen, and that corn can be bought at 18¢ a can or 3 cans for 50¢. How much would be saved by purchasing a dozen cakes of soap at a time? Or 6 cans of corn?

Name three other articles that might be bought in quantity. Name three articles that it would be unwise to purchase in quantity.

The thrifty housewife can also save money by paying cash for her purchases. Gas and electric companies often deduct a certain amount from their bills for prompt cash payments.

Suppose that Mrs. Jones's gas bill for February is \$5.50 with 5% off for cash within five days. How much does Mrs. Jones save if she pays her bill promptly?

The prompt payment of bills benefits both the buyer and the seller. The buyer saves money; the seller benefits because prompt payment helps him to pay his bills promptly and saves him the cost of collecting the money due him.

The thrifty housewife can save money by buying at a "cash and carry" store. She knows that the grocer who maintains an automobile delivery service must charge more for his groceries than the grocer whose customers carry home their purchases. Why?

The thrifty housewife can take advantage of sales at which articles of food or clothing may be purchased at reduced rates.

80. Problems

1. At a sale of gloves the following reductions were made:

\$1.15 quality for 85¢	\$1.75 quality for \$1.35
\$1.50 quality for \$1.00	\$1.95 quality for \$1.65
\$1.65 quality for \$1.20	\$2.25 quality for \$2.00

How much would be saved by buying (a) two pairs of the \$1.95 quality at the sale? (b) A pair of the \$1.65 quality?

2. At a clearance sale of furniture, the following prices were quoted:

Davenport table	formerly \$75.00	now \$39.50
Arm chair	formerly \$175.00	now \$137.50
Hall chair	formerly \$185.50	now \$145.75
Rocker, mahogany	formerly \$87.50	now \$65.00

(a) At the sale, the davenport table is sold for \$_____ less than its former price; (b) a hall chair is sold for \$_____ less than its former price; (c) Mrs. Hall bought an arm chair at the sale. She saved \$_____. (d) Find the total saving on the four articles if purchased at the sale.

3. The following is the price list advertised by a grocery store for a week-end sale:

<i>Article</i>	<i>Regular Price</i>	<i>For This Sale</i>
Apricots	27¢ can	2 for 49¢
Pears	35¢ can	2 for 68¢
Peaches	32¢ can	2 for 58¢
Soap, naphtha . .	6¢ cake	6 for 30¢
Soap, Ivory . . .	5¢ cake	6 for 25¢
Rice flakes	15¢ box	2 for 25¢

Imagine yourself to be the grocery clerk.

Customer A buys 4 cans of apricots, 2 cans of pears, and 2 boxes of rice flakes. (a) What does she pay for these articles at sale prices? (b) How much does she save? (c) How much change should she receive if she pays for her purchases with a five-dollar bill?

4. Customer B buys 6 cakes of naphtha soap, 4 cans of pears, and 2 cans of apricots. (a) She spends \$_____. (b) Buying at sale prices, she saves \$_____.

5. How much would a customer save by buying 6 cans of pears at the sale instead of buying 1 can at six different times?

*6. By paying his bill within 10 days, Mr. Frank was allowed a 2% reduction on his coal bill. He bought 6 T. of coal at \$12.75 per ton. (a) How much money did he save? (b) What would he save on 8 T. at \$14.75 per ton?

7. For each of the following, find the amount of money saved by paying cash:

<i>Article</i>	<i>Cost</i>	<i>Off for Cash</i>	<i>Amount Saved</i>
(a) Gas range . . .	\$75.00	10%	?
(b) Table (kitchen) . .	\$12.50	5%	?
(c) Davenport . . .	\$187.50	15%	?
(d) Buffet . . .	\$95.00	12½%	?
(e) Dining table . .	\$47.50	10%	?

8. A dealer offered 12% off for cash on a table costing \$75.50. How much would a customer save by paying cash?

9. A grocer received a bill of \$750.75 with 5% off if paid within 10 days. Find the amount he saved by prompt payment of the bill.

10. The Browns' gas bills for the first six months of last year were as follows:

January \$4.50	March \$4.25	May \$4.35
February \$4.75	April \$4.00	June \$3.80

If Mrs. Brown is allowed 2% off on each bill for prompt payment, how much does she save (a) in each month? (b) In the six months?

11. For payment at the time of purchase, a wholesale dry-goods merchant allows a reduction of 5% from the amount of the bill. How much will Mr. Johnson save on a bill of \$550.80 by cash payment?

12. Bring in a bill from your home, showing a reduction for prompt payment; or a reduction for a quantity purchase; or a reduction granted at a sale.

81. Order Blanks

Mr. James is preparing to plant a garden this spring. He has selected his seeds from the catalogue of Jones, Robinson, and Brown, Seedsmen, of Boston, Massachusetts. The following is his order, prepared on the *order blank* found in the catalogue:

JONES, ROBINSON, AND BROWN

Seedsmen

64 Commercial Street

Boston, Massachusetts

Name: John B. James, Jr.

Residence or P. O. Address: 384 Chestnut Ave.

City: Germantown State: Pa. R.F.D. _____

How sent? Parcel Post Amount inclosed {Check \$2.40
P.O. Order

Catalogue Number	Quantity	Name of Article				
B 3759	3 pkt.	Stringless Bean		25		75
B 3942	3 pkt.	Bush Lima Bean		30		90
L 374	2 pkt.	Cos Lettuce		15		30
L 379	3 pkt.	Brittle Ice Lettuce		15		45
		Total amount				2 40

How many items are ordered? What is the total amount of the order? How are the seeds to be sent? How did Mr. Jones pay for the seeds?

Many large business concerns issue *order blanks* in connection with their catalogues. Ordering goods by means of these blanks saves time for both the dealer and

the customer. It is easy, too, for the dealer to keep these uniform order blanks on file for reference.

Mr. White wishes to send *The Sportsman's Magazine* to his friend Mr. Dick as a Christmas gift. This is the order blank which he will use:

THE SPORTSMAN'S MAGAZINE

285 Main St., Garden City, L. I., N. Y.

Enclosed is check for \$2.50, for which kindly enter a gift subscription to

The Sportsman's Magazine

to be sent to the following address until January, 1931:

Send to: *Mr. J. B. Dick*

Sent by: *Fred J. White*

Address: *3284 South St.*

Address: *87 Juniper St.*

City: *Brooklyn*

City: *Hyde Park*

State: *N. Y.*

State: *Ill.*

Who will receive the magazine during 1930? Who sends it? How is payment made for the subscription?

Write an order form for a year's subscription to *St. Nicholas Magazine* to be sent by you to your cousin. Supply all the necessary information.

82. Sales Slips

When you make a purchase at a department store, the clerk who serves you makes out two copies of a *sales slip*. One copy is inclosed in the package with your purchase; the other copy is retained by the clerk. This sales slip is a record of your purchase. The following is a common type of sales slip:

FRANK E. DAVIS CO.

Dry Goods

384 Fourth Ave.

Newton, N. Y.

*Feb. 3, 1930*Name: *Miss J. E. Fort*Address: *745 Sinclair Rd.**Amt. Rec'd. \$20.00*

12 yd. Lace @ .30	3	60
1 pr. Silk Hose @ 1.95	1	95
$\frac{1}{2}$ doz. Napkins @ 7.50	3	75
1 Table Cloth @ 6.00	6	00
	15	30

Where were the goods purchased? To whom were they sold? How many items were purchased?

The total amount paid for each item is called the *extension*. Adding all the extensions to find the total is called *footing the bill*.

What is the total amount of the purchase? How much money did Miss Fort give the clerk in payment?

Sales slips are always made out at the time that a purchase is made. The sale may be a cash sale or a sale on account. Look at the sales slips which you receive when you make purchases at different stores. What differences do you notice?

J. J. Dodd				
BUTTERCUP DAIRY				
Dealer In				
BUTTER, CHEESE, and EGGS				
305 Elm St.				
Tel. Main 456			N. Y., <u>Dec. 1, 1929</u>	
Sold to <u>Mrs. Frank Dean</u>				
<u>464 East 182 St.</u>				
Dec.	1	2 lb. Sweet Butter @ .62	1	24
		$\frac{1}{2}$ lb. Salt Butter @ .56		28
		1 doz. Eggs @ .70		70
			2	22
		Received Payment		
		<i>Dec. 1, 1929</i>		
		<i>J. J. Dodd</i>		
		<i>per L. L. A.</i>		

Here is a sales slip from a dealer in dairy products.

The purchaser has paid for the goods. You will note that the slip has been *receipted*. On what date was payment made? Did the owner of the store receipt the slip?

1. Imagine yourself to be a clerk in a large grocery store. Make out sales slips for the following purchases. Supply all the necessary information:

- | | |
|------------------------|--------------------------|
| (a) 3 cans Peas @ 18¢ | (b) 2 loaves Bread @ 12¢ |
| 2 lb. Butter @ 55¢ | 3½ lb. Sugar for 27¢ |
| ½ doz. Eggs @ 68¢ | 2 lb. Coffee @ 48¢ |
| (c) ¾ lb. Cheese @ 40¢ | (d) ½ lb. Tea @ 90¢ |
| 3 lb. Potatoes for 14¢ | 3 cans Milk @ 9¢ |
| 3 cans Corn for 50¢ | 1 can Cocoa @ 22¢ |

2. Bring to class an advertisement from a daily paper. Make up two sales slips, using the prices given in your advertisement. Supply all other necessary information.

83. Bills

When a customer does not pay cash at the time of purchase, a *bill* or statement is sent to him at the end of the month.

A bill is a written statement of the amount of money due a creditor for materials purchased or for service rendered. A bill often contains the terms on which a sale is made.

Though they may differ in certain details, both sales slips and bills contain the following items:

1. The name and address of the merchant or dealer who makes the sale.
2. The name and address of the purchaser.
3. The date on which the purchase was made.
4. The cost of each item purchased.
5. The total amount of the purchase.

A sales slip is a record of purchases made on one day; a bill is frequently a record of sales made on different days.

Mr. Farley is having his house painted. He purchased his supplies from Smith and Jones, dealers in hardware and paints, on September 20 and 22. On October 1 he received the following bill:

SMITH AND JONES							
Hardware and Paints							
1482 Broadway							
Brooklyn, N. Y.							
				Oct. 1, 1929			
				D. J. Farley			
Terms: Monthly Settlement				30 South Street			
				Brooklyn, N. Y.			
Date		Description					
Sept.	20	10 gal. Sun Paint @ 4.50		45	00		
		3 gal. Dryer @ 2.75		8	25		
	22	5 gal. Sun Paint @ 4.50		22	50		
						75	75
		Received Payment					
		October 10, 1929					
		Smith and Jones					
		Per L. A. H.					

Are the extensions correctly made? Is the footing correct?

When was the bill paid?

Did Mr. Smith or Mr. Jones receipt the bill?

Make out a bill showing purchases made on three different days. Receipt the bill.

Bills for materials and labor differ slightly from the bills you have just studied.

The mechanic or contractor who makes repairs on your house not only charges for materials used, but he also adds a charge for his labor.

Monmouth, N. J. May 1, 1930					
Mr. J. B. Sprague 238 John Street To Robert Davison, Dr.					
Apr.	5	3 qt. White Clover Seed @ 1.25	3 75		
		8 hr. Labor on Lawn @ .50 per hour	4 00		
Apr.	6	4½ hr. Labor on Lawn @ .50 per hour	2 25		
<i>Received Payment</i> <i>May 7, 1930</i> <i>Robert Davison</i>				10 00	

(Dr. means debtor, one who owes. Cr. means creditor, one to whom money is owed.)

1. Mr. F. A. Osgood, a plumber in Huntington, L. I., did repair work for Mr. W. B. Collins of the same town. The plumber supplied 19 ft. of copper leader at 40¢ per foot, and charged \$1.25 per hour for labor. He worked 2 hr. 30 min. Make out the bill.

2. Perhaps your house has been wired for electricity or your father has had the kitchen painted, or your mother has had new covers made for the living-room chairs. Make out a bill for any one of these items.

Be careful to learn the current prices for labor and materials.

Doctors, dentists, lawyers, and other professional men send bills in somewhat different form, as you will notice from the one below:

HENRY J. MOORE, M.D.

40 E. 41 St., N. Y.

Dec. 1, 1929

To Miss E. K. Leonard
21 W. 49 St., N. Y.

For professional services

\$25.00

Received Payment

Dec. 19, 1929

Henry J. Moore, M.D.

Per M. E. Parker

Dr. A. A. West, a dentist having an office at 75 W. 181 St., N. Y., presents his bill for \$72.50 to Mr. James L. Lee, of Westbury, L. I., for professional services on July 12 and 16. Make out the bill.

84. Getting a Receipt

When a purchaser pays a bill, he should be given some proof that the bill has been paid. Such proof usually takes the form of a receipt.

On some of the bills you have just studied, you have noticed one form of receipt.

Sometimes another type of receipt is used. Two forms are shown here. How do they differ?

NEW YORK, Nov. 24, 1929Received from John Moorein settlement of his accountTwo hundred and $\frac{00}{100}$ ~~~~~ Dollars\$200 $\frac{00}{100}$ Samuel BrownDec. 16, 1929Received from James WalkerOn accountOne hundred and $\frac{00}{100}$ ~~~~~ Dollars\$100 $\frac{00}{100}$ Allan Stuart

A receipt may be in *full* settlement of an account or it may be for only *part* of the amount due.

Why is the amount written twice? Why should all receipts be kept?

Write a receipt for each of the following, supplying needed facts that may have been omitted:

1. John Allen borrowed \$500 from Henry Wise. On June 6, he paid the amount in full.

2. On August 1, Joseph Dane received \$750 from James Burden in part payment of his account.

3. J. M. Noble received \$55.24 from John Alexander in payment of a bill. The money was paid May 25.

4. Imagine that you are the treasurer of a club. Write a receipt for dues received from a member of the club.

5. Write the receipt Dr. Simms gave Anna Perkins when she paid him \$75 in full settlement of her account.

6. Dr. Brandon received \$50 on account from Mrs. Baird. Write the receipt he gave her.

7. Write a receipt for rent of the premises at 84 Bradford Ave. for March 19. The tenant is Mr. K. L. Ford; the owner, Mr. F. E. Lyman; the rent, \$75.50 per month.

8. Bring in a receipt from home. Explain it to your classmates and teacher.

9. Fred Smith bought a basket ball from you for \$5. Write a receipt for him.

10. Your mother pays a grocery bill of \$7.50 to Mr. F. J. Brown, of 484 Main St. Write the receipt.

11. Mr. F. F. Jennings owes Mr. J. F. Stanley \$500. He pays Mr. Stanley \$250 on account. Write the receipt.

12. Suppose that Dr. J. F. Linton made five visits to your home while you were ill and that he charged \$5 a visit. Make out the bill he would send to your father for his services.

13. Read again the "Smith and Jones" bill on page 110. Write a similar bill for the following supplies purchased by Mr. Farley:

3 Sun Brushes @ \$.85

1 can Floor Varnish @ \$1.85

2 gal. Floor Paint @ \$4.85

2 cans Floor Stain @ \$.95

Supply all necessary information. Receipt the bill, using your own name.

Sometimes bills are paid by *check*. A check is a written order on a bank to pay a certain amount of money to the person whose name appears on the *face* of the check. The signer of the check must have enough money on deposit in the bank to cover the amount called for by the check. A form of check is shown below:

No. _____	NEW YORK _____ 19__
CENTRAL TRUST COMPANY	
PAY TO THE	
ORDER OF _____	\$ _____
_____	DOLLARS

The returned check acts as a *receipt*. Therefore, it is wise to keep all checks returned to you by the bank.

85. Profit and Loss

Mr. Henry sells furniture. He bought tables at \$35 each and sold them at \$45.50 each. What was the difference between the cost and the selling price?

When an article is sold for *more* than its cost, it is said to be sold at a *profit*. What was the amount of profit on each table sold by Mr. Henry?

When a man invests his money in any line of business, his object is, of course, to make a profit on his investment. To do this, he must sell his wares for more than they cost him.

The cost of an article, however, usually includes more than just the sum of money paid for it. For example, the cost of Mr. Henry's tables — \$35 each — is but one item in Mr. Henry's expense account as a furniture dealer. In addition to buying his stock, he must pay rent; he must pay for light, heat, and telephone service; he must pay salaries to his employees; he must carry insurance to protect his stock.

The expenses necessary to carrying on the business are called *overhead expenses* or simply *overhead*. If you think for a moment, you will readily understand that overhead expenses may run into quite a large sum.

A study of the retail trade in several lines has just been completed. It shows that, in the United States, the overhead in clothing, hardware, shoes, dry goods, and other lines may range between 20% and 30% of the first cost.

Mr. Henry may find that he cannot sell his tables readily at \$45.50 each; he may therefore be forced to reduce them *below cost*, and so suffer a *loss*.

In fixing upon the selling price of an article, a merchant must consider (1) *first cost*, and (2) *overhead*. The cost of an article plus the overhead equals the *total cost*. In order to yield a profit on the investment, the selling price must be sufficient to cover (1) first cost, plus (2) overhead, plus (3) profit on the investment.

In these exercises, unless it is otherwise stated, profit and loss (and the per cent of profit or loss) will be reckoned on the *total cost*.¹

¹ Profit and loss and the per cent of profit and loss are sometimes based on cost and sometimes on selling price.

1. Tell at sight the amount of profit:

	<i>Cost</i>	<i>Selling Price</i>	<i>Profit</i>		<i>Cost</i>	<i>Selling Price</i>	<i>Profit</i>
(a)	\$.16	\$.20	?	(e)	\$7.50	\$10.00	?
(b)	\$16.00	\$25.00	?	(f)	\$50.00	\$62.50	?
(c)	\$20.00	\$22.50	?	(g)	\$3.80	\$4.60	?
(d)	\$.50	\$.85	?	(h)	\$9.60	\$12.00	?

2. An article sold for \$60. Its cost was \$45. The gain was ____.

3. Mr. Henry paid \$42.75 apiece for desks which sold at \$50 each. The profit on each desk was ____.

4. Mr. Jones deals in radios. On a certain radio, the first cost is \$74.50 and the overhead \$5.50. If the radios sell at \$90 each, what is the profit on each?

5. Tell at sight the amount of loss:

	<i>Selling Price</i>	<i>Cost</i>	<i>Loss</i>		<i>Selling Price</i>	<i>Cost</i>	<i>Loss</i>
(a)	\$10.50	\$12.00	?	(d)	\$.54	\$.75	?
(b)	\$7.85	\$10.00	?	(e)	\$6.50	\$7.75	?
(c)	\$.95	\$1.10	?	(f)	\$3.20	\$4.00	?

6. Mr. Ames paid \$700 for a car, and was forced to sell it for \$635. He lost ____.

7. Suits that cost \$48.50 were sold at an end-of-the-season sale for \$42. This meant a ____ of ____ on each suit.

8. Mr. Putnam manufactures washing machines. The first cost of each machine is \$90 and the overhead is \$30. If Mr. Putnam sells each machine for \$150, (a) what is the amount of his profit? (b) What is the per cent of profit?

86. Finding Profit or Loss

A suit that cost \$45 was sold at a 20% profit. Find the profit.

$$20\% = .20 = \frac{20}{100} = \frac{1}{5} \qquad \frac{1}{5} \times \overset{\$9}{\cancel{\$45}} = \$9 \text{ profit}$$

To find the profit or loss, multiply the cost by the per cent of profit or loss.

This is the same as finding a ____ of a number.

Without pencil.

1. An article that cost \$3.60 was sold at a profit of 25%. What was the profit?
2. Coats which cost \$60 each were sold at a gain of 30%. Find the gain.
3. Find the profit on an automobile bought for \$800 and sold at 25% profit.
4. A phonograph which cost \$48 was sold at $16\frac{2}{3}\%$ profit. What was the profit?
5. A coat that cost \$40 was sold at a loss of 20%. Find the loss.
6. A man paid \$700 for a used car and sold it at a 10% loss. He lost ____.
7. A dealer paid \$740 for a piano and was forced to sell it at a loss of 30%. His loss was ____.

87. Finding the Selling Price

A suit that cost \$45 was sold at a profit of 20%.

(a) Find the profit. (b) Find the selling price.

$$\frac{1}{5} \times \overset{\$9}{\cancel{\$45}} = \$9 = \text{profit} \quad \$45 + 9 = \$54 = \text{selling price}$$

Selling price equals cost plus profit or cost minus loss.

1. A farm which cost \$12,000 was sold at a gain of 25%. For what price was it sold?

2. Mr. Henry sells davenports for which he paid \$156 each at a gain of $33\frac{1}{3}\%$. What is the selling price?

3. A watch which cost \$120 was sold at a loss of $12\frac{1}{2}\%$. For what price was it sold?

4. A consignment of cotton cost \$1800. It was sold at a loss of $16\frac{2}{3}\%$. The selling price was ____.

5. What price must a dealer ask for a piano that cost \$950 in order to make a profit of 30%?

6. Mr. James has purchased a machine for \$750. He wishes to make a profit of 35% on his purchase. For what sum must he sell it?

7. Mr. Henry paid \$42 for a chair. For what must he sell it to make a profit of $16\frac{2}{3}\%$?

8. I bought a farm for \$9500. I spent a sum equal to 20% of the purchase price on improvements. What must I sell it for to gain 20% on my investment?

9. Complete:

(a) The total cost of an article includes the ____ and the ____.

(b) When an article is sold above cost, it is sold at a ____.

(c) When sold at a loss, an article is sold ____ cost.

(d) In addition to the actual cost of an article, there are usually other items of expense, such as ____ and _____. These are called ____.

10. Mr. Miller bought an automobile for \$300. He spent \$180 on it for repairs and painting. What must he sell it for to gain 40%?

88. Finding the Per Cent of Profit or Loss

Without pencil.

A coat which cost \$45 was sold at a gain of \$15. Find the per cent of gain.

\$15 is what per cent of \$45? $\frac{15}{45} = \frac{1}{3} = .33\frac{1}{3} = 33\frac{1}{3}\%$ gain

Check: $33\frac{1}{3}\% = \frac{1}{3}$ $\frac{1}{3} \times \$45 = \15

Finding the per cent of gain is like finding what per cent one number is of another.

1. Tell at sight the per cent of gain or loss:

	Cost	Gain		Cost	Loss
(a)	\$250	\$50	(f)	\$200	\$50
(b)	\$8	\$1	(g)	\$12	\$2
(c)	\$15	\$3	(h)	\$24	\$3
(d)	\$2400	\$600	(i)	\$1600	\$200
(e)	\$25	\$5	(j)	\$75	\$25

2. A book which cost \$2 was sold at a gain of \$.50. The rate of gain was ____.

3. A radio which cost \$100 when new was sold six months later at a loss of \$25. What was the per cent of loss?

4. Articles which cost \$10 each were sold at a loss of \$2 because of damage by fire. The per cent of loss was ____.

5. A pen which cost a dealer \$10 was sold for \$14.
(a) What was the gain? (b) What was the gain per cent?

6. Mr. Ford bought dress goods at \$4.50 per yard and sold it for \$6 per yard. What was the per cent of profit?

With pencil.

7. A horse bought for \$125 was sold for \$105. The per cent of loss was ____.

8. An automobile costing \$1250 is sold for \$1050. The rate of loss is ____.

9. A building cost \$11,000. The owner spent \$1680 on repairs. He then sold it for \$14,000. What per cent did he gain on the total cost?

10. A merchant bought 240 yd. of silk at $\$1\frac{1}{8}$ per yard. He sold it at a gain of \$54. What per cent did he gain?

11. At a special sale, furniture was marked down as follows:

	<i>Original Price</i>	<i>Sale Price</i>
Tables	\$72	\$60
Chairs	\$27	\$21

On which of the two articles was the per cent of reduction larger?

12. A desk chair cost Mr. Henry \$12.50. What per cent would he gain by selling it for \$15?

13. Fur coats were priced \$240 in November. At a January sale they were sold for \$192. What per cent reduction was made?

14. If the cost of an article is \$5.60 and the selling price is \$7.28, what is the gain per cent?

89. General Review of Profit and Loss

Without pencil.

1. A coat costing \$24 was sold at a gain of 25%. The selling price was ____.

2. Eggs bought at \$.48 per dozen are sold at a gain of $12\frac{1}{2}\%$. The selling price per dozen is ____.

3. At the end of the season Miss Price, a milliner, sold a hat which cost \$12 at a loss of $16\frac{2}{3}\%$. How much did she receive for the hat?

4. At what price must I sell a book which cost \$1 to make a profit of 20%?

5. Fish bought at 12¢ per pound is sold so as to gain $33\frac{1}{3}\%$. It sells for ____ per pound.

6. Sam paid \$5 for a dog. At what price must he sell it to gain 25%?

7. Mr. Jones bought a lot for \$2400. He was forced to sell it at a loss of 25%. How much did he get for it?

8. Mr. Williams bought a lot for \$1300. He spent \$200 for taxes and improvements. For what price must he sell it to gain 20% on his investment?

9. A horse was bought for \$125 and sold at a loss of 8%. It was sold for ____.

*10. I bought a house for \$8000. How much rent must I charge per month to make 9% on my investment?

Use pencil if needed.

11. Complete:

	<i>Cost</i>	<i>Selling Price</i>	<i>Gain</i>	<i>Loss</i>	<i>Rate of Gain or Loss</i>
(a)	\$6400	\$6784			
(b)	\$12,000	\$12,700			
(c)	\$1500	\$1000			
(d)	\$48,000	\$42,000			
(e)	\$24,000	\$27,000			
(f)	\$8500	\$9010			
(g)	\$12,600	\$11,400			
(h)	\$16,000	\$16,400			

12. James bought a pair of skates for \$3.75 and sold them at a profit of \$.50. What was the per cent of profit?

13. What is gained by the sale of 8 lots, costing \$1500 each, if they are sold at 35% profit?

14. Find the profit on 150 T. of coal bought at \$8.50 per ton and sold at a gain of 20%.

15. Shoes cost a dealer \$4.80 a pair. He sells them at an advance of 14%. How much will he gain on 175 pairs?

16. Complete:

	<i>Cost</i>	<i>Gain %</i>	<i>Gain</i>	<i>Loss %</i>	<i>Loss</i>	<i>Selling Price</i>
(a)	\$7.50	10				
(b)	\$95.00	15				
(c)	\$42.50			10		
(d)	\$180.00			35		
(e)	\$37.50	20				
(f)	\$56.00	12				

	<i>Cost</i>	<i>Gain%</i>	<i>Gain</i>	<i>Loss%</i>	<i>Loss</i>	<i>Selling Price</i>
(g)	\$5.75			40		
(h)	\$16.64			75		
(i)	\$7.75	40				
(j)	\$372.00			$16\frac{2}{3}$		
(k)	\$17.28	$12\frac{1}{2}$				

90. Finding the Cost

A dealer sold a house at a gain of \$1200. This was 20% of its cost. What did the house cost him?

$$\$1200 = 20\% \text{ of what number?}$$

$$20\% = \frac{1}{5}$$

$$\$1200 = \frac{1}{5} \text{ of the cost}$$

$$\frac{5}{5} \text{ of the cost} = 5 \times \$1200 = \$6000 = \text{cost}$$

$$\text{Check: } \frac{1}{5} \text{ of } \overset{\$1200}{\cancel{\$6000}} = \$1200$$

This problem is like a problem in finding a number when a per cent is given.

1. A dealer sold a popular biography at a gain of 25%. His profit on each copy was \$1.84. What did each copy cost him?

2. Father sold potatoes at a profit of \$217.50. What did they cost him if the rate of profit was 15%?

3. When the gain on an article is \$3.60 and the rate of gain is 20%, what is the cost?

4. A consignment of cotton was sold at a profit of $16\frac{2}{3}\%$. The amount of profit was \$325. What was the cost of the cotton?

91. Commission

The Talbot Farm in our town was divided into building lots. A real-estate agent sold a lot to Mr. Preston for \$1200. He received as his fee 5% of the amount for which the lot was sold. How much money did he receive?

$$5\% = \frac{5}{100} = \frac{1}{20} \qquad \frac{1}{20} \times \overset{\$60}{\cancel{\$1200}} = \$60$$

The agent received \$60. This was his pay or *commission* for selling the lot.

Commission is one of the business applications of percentage. Many persons earn their living by selling goods or property for others. For this service a certain sum is charged. This charge is called commission. Thus, when a real-estate agent buys and sells real estate or collects rents, his pay for his services is called commission. Similarly, in addition to his salary, a salesman is often allowed commission on the amount of goods he sells. Brokers, also, receive a commission for buying and selling stocks and bonds for their customers.

A *commission merchant* buys and sells produce. For doing this he charges a certain per cent of the amount of the transaction. This charge is called his ____.

The commission is the amount a person receives for selling goods or property, or transacting business for another. Commission is often expressed as a certain per cent. This per cent is called the *rate of commission*.

An agent, working on a 5% commission, makes a sale amounting to \$575. How much does he receive as his commission?

A. 5% = .05

\$575

.05

\$28.75 commission

B. 5% = $\frac{5}{100} = \frac{1}{20}$

$\frac{1}{20} \times \frac{\$115}{\$575} = \frac{\$115}{4} = \$28\frac{3}{4}$ or \$28.75

commission = \$28.75

To find the commission, change the *rate of commission* to its decimal or fractional equivalent. Then multiply the value of the goods bought or sold by this decimal or fraction.

This is the same as finding a per cent of a number.

Use pencil if needed.

1. Find the amount of commission on each of the following sales at the rates given:

Amount of Sale	Rate of Commission	Amount of Sale	Rate of Commission
(a) \$900	5%	(e) \$9750	8%
(b) \$1700	3%	(f) \$150.50	4%
(c) \$1890	2%	(g) \$1785.25	5%
(d) \$1200	6%	(h) \$75.75	3%

2. What is the commission, at 3%, on \$200 worth of goods?

3. An agent sells \$540 worth of goods at 2% commission. He receives _____ for this service.

4. At 5% commission, how much would an agent receive for selling a lot for \$1500?

5. A lawyer collected a debt of \$1950, charging 10%. His commission amounted to ____.

*6. A commission merchant charging 10% sold 100 bbl. of potatoes at \$4.50 a barrel. How much money did he receive?

*7. An agent sold a piece of property for \$3600. The rate of commission was $2\frac{1}{2}\%$. What was the amount he received?

*8. Our town has contracted to build a new junior high school that will cost \$450,000. The architect who drew the plans received a commission of 6%. What was the amount of his commission?

92. Finding the Net Proceeds of a Sale

Mr. Preston paid the agent \$1200 for one of the Talbot Farm lots. The agent's rate of commission was 5%. Therefore, he kept \$60 (5% of \$1200) and sent, or remitted, to Mr. Talbot \$1140. This amount is called the *net proceeds* of the sale. It is the amount left after the commission has been deducted.

An agent, working on a 5% commission, collected a debt amounting to \$575. (a) What was his commission? (b) How much did his employer receive?

\$575 amount collected	\$575.00 amount collected
.05 rate of commission	\$28.75 commission
\$28.75 commission	\$546.25 net proceeds

To find the net proceeds, subtract the commission from the selling price.

With pencil.

1. A real-estate agent collects \$5750 in rents each month. He charges 3% commission. (a) How much does he receive each month? (b) How much does he remit to the owner? (c) What will his commissions amount to in a year?

2. A commission merchant sells 1500 bu. of wheat, at \$1.25 per bushel, charging 5% commission. (a) How much does he receive for this service? (b) What are the net proceeds of the sale?

3. A real-estate dealer sold a piece of property for \$15,000. The rate of commission was $3\frac{1}{2}\%$. (a) How much did the owner receive? (b) What was the agent's commission?

4. Mr. Pratt's salary as a salesman is \$40 per week. In addition, he receives a commission of 2% on sales. His sales last week amounted to \$750. Find his total income for the week.

5. A lawyer collected 85% of a debt of \$1500. The rate of commission was 5%. (a) How much money did the lawyer collect? (b) What did his commission amount to? (c) How much should he remit to the creditor?

*6. A fruit grower shipped 1200 baskets of peaches to a commission merchant, who sold them at \$.75 per basket. Freight charges amounted to \$45.50; the rate of commission was 3%. (a) What was the agent's commission? (b) How much money did the grower receive?

7. A commission merchant sold 120 bbl. of apples at \$6.75 per barrel, and charged a $2\frac{1}{2}\%$ commission. How much did he remit to the owner?

8. A real-estate dealer sold 6 lots at \$1500 each, and received 5% commission. His commission amounted to \$____. The owner received \$____.

9. Find the commission and the net proceeds on the following sales:

(a) \$600 at 3%

(e) \$175.28 at 4%

(b) \$1200 at $3\frac{1}{2}\%$

(f) \$475.85 at $12\frac{1}{2}\%$

(c) \$980 at $1\frac{1}{2}\%$

(g) \$1680.50 at 5%

(d) \$1275 at 6%

(h) \$850.00 at 20%

93. A Short Way of Finding the Net Cost

At a sale, a coat regularly listed at \$175.50 was sold at a discount of 20% . Find the net cost.

The list price of the coat equals 100% of itself. If the coat is sold at a discount of 20% , it is sold for 80% of the list price. ($100\% - 20\% = 80\%$.) Therefore, the *net cost* is 80% of \$175.50.

A.

$$80\% = .80$$

$$.80 \text{ of } \$175.50 = \$140.40 = \text{net cost}$$

B.

$$80\% = .80 = \frac{80}{100} = \frac{4}{5}$$

$$\frac{4}{5} \text{ of } \begin{array}{c} \$35.10 \\ \cancel{\$175.50} \end{array} = \$140.40 = \text{net cost}$$

1. A sewing machine listed at \$85.75 was sold at a discount of 15% . For what price was it sold?

2. When an article is sold at 25% discount, the net cost is ____% of the list price.

3. What per cent of the list price is paid for goods bought (a) at a discount of $33\frac{1}{3}\%$? (b) At a discount of $16\frac{2}{3}\%$?
4. Find the net cost of 42 pairs of gloves at \$2.50 a pair, less 30%.
5. At a sale Carl bought a pair of hockey skates listed at \$11.50 at $\frac{1}{5}$ off. How much did the skates cost Carl?
6. In each of the following examples, find the net cost in two ways:

<i>List Price</i>	<i>Discount</i>	<i>List Price</i>	<i>Discount</i>	<i>List Price</i>	<i>Discount</i>
(a) \$45	$\frac{1}{5}$ off	(e) \$58.50	10%	(i) \$7.50	$\frac{1}{3}$ off
(b) \$85	20%	(f) \$74.80	25%	(j) \$1624.50	40%
(c) \$300	$12\frac{1}{2}\%$	(g) \$59.40	$33\frac{1}{3}\%$	(k) \$1800	15%
(d) \$568	$37\frac{1}{2}\%$	(h) \$120.20	6%	(l) \$880	$7\frac{1}{2}\%$

94. Review of Terms in Commission

1. A person who buys, or sells, or transacts business for another is called an ____ or a ____.
2. The sum charged by an agent for transacting the business of another is called the ____.
3. The commission is a certain per cent of the amount of money involved in the business transaction. This per cent is called the ____ of commission.
4. Agents often buy as well as sell for others. When a purchase is made, the agent reckons his commission on the amount of money involved in the purchase. When a sale is made, the commission is reckoned on the amount of ____.
5. The commission is deducted from the amount of money involved in the sale. The difference is remitted to the _____. This difference is called the _____.

95. Interest

Mr. Elliott decided to increase his stock of merchandise in preparation for the spring trade. To do this, he borrowed \$2000 from the Gotham Bank for a year. At the expiration of that time, the bank charged Mr. Elliott 6% of \$2000, or \$120, as payment for the use of the \$2000. This extra sum, \$120, is called *interest*.

The \$2000 which Mr. Elliott borrowed is called the *principal*. Interest is always computed as a certain per cent of the principal. This per cent is called the *rate*, or the rate of interest. In this case, it was ____%.

The period for which the principal is borrowed is called the *time*. The time in this case was one year. If Mr. Elliott borrowed the \$2000 for two years, he would pay twice as much interest, or \$_____.

Interest is money paid for the use of money.

When Mr. Elliott settled his account with the bank at the end of the year, he paid \$2000 (principal) and \$120 (interest), or \$2120. The sum of the principal and the interest is called the *amount*.

Fill in the blanks below with the proper terms:

1. \$2000 is the amount borrowed by Mr. Elliott. It is called the ____.
2. One year is the ____ for which the ____ was borrowed.
3. Six per cent is the ____ of interest paid on the ____.
4. \$120 is the ____ on \$_____ at ____% for ____.
5. The amount is the ____ of the ____ and the ____.
The amount in this case was \$_____.
6. Money paid for the use of money is called ____.

96. Interest for One Year

What is the interest on \$720 for 1 year at 6%?¹

A. \$720 principal .06 rate \$43.20 interest	B. \$7.20 \$720 $\times \frac{6}{100} =$ \$43.20 interest
--	--

Find the interest for one year on each of the following sums at the rates given:

- | | | |
|-----------------|----------------|-----------------|
| 1. \$500 at 6% | 4. \$800 at 4% | 7. \$1200 at 5% |
| 2. \$200 at 6% | 5. \$600 at 4% | 8. \$900 at 5% |
| 3. \$1000 at 6% | 6. \$300 at 6% | 9. \$700 at 4% |

97. Interest for More Than One Year

Mr. Chambers borrowed \$750 for 2 years, paying interest at the rate of 5%. How much would he pay in interest for the 2 years?

A. \$750 principal .05 rate \$37.50 interest for 1 year 2 \$75.00 interest for 2 years	B. \$7.50 \$750 $\times \frac{5}{100} \times 2 =$ \$75.00 interest
--	---

¹ Unless otherwise stated, rates of interest in this book are to be regarded as *annual* rates.

How do you find the interest for more than one year?

Two important facts concerning interest for more than one year must be kept in mind. In the first place, we must remember that we must find the interest for one year before we can find the interest for a longer period. In the above example, Mr. Chambers paid interest on \$750 at the rate of 5% per year for each of two years. If the money was kept for a longer period, Mr. Chambers would pay at the rate of 5% per year for each year's use of the \$750.

In the second place, we must remember that interest on borrowed money must be paid at *certain definite intervals*. When money is borrowed for periods longer than a year, interest is usually paid at the end of each year or at the end of each six months. Banks require the payment of interest at the end of every six months.

1. Find the total amount of interest on each of the following sums:

<i>Principal</i>	<i>Rate</i>	<i>Time</i>	<i>Principal</i>	<i>Rate</i>	<i>Time</i>
(a) \$350	6%	2 years	(d) \$280	4%	3 years
(b) \$480	6%	3 years	(e) \$1200	4%	2 years
(c) \$1750	6%	3 years	(f) \$950	5%	2 years

2. Mr. Chase borrowed \$1500 at 5% interest.
(a) What was the annual interest on the loan? (b) If Mr. Chase kept the principal for 3 years, how much interest did he pay in all?

3. A man borrowed \$14,000 to invest in an orchard. The rate of interest was 5%. How much interest would be paid in all for 4 years' use of the money?

4. A schoolhouse in a small town cost \$75,000.
(a) At 4%, what is the yearly interest on this sum?
(b) How much interest would be paid in all for 3 years?

5. Mr. Platt borrowed \$950 for 1 year from the Chat-
ham Bank at 6% interest. (a) How much did he owe
at the end of the year? (b) How much of this sum was
interest?

6. Fred Stone borrowed \$550 at 6% and agreed to
pay the bank \$583 at the end of a year. How much of
this sum was interest?

98. Interest for Less Than One Year

Mr. Jones borrows \$650 from his bank for 6 months,
paying interest at the rate of 6% for the use of the money.
How much interest must he pay?

A.	B.
\$650 principal	
.06 rate	
2)\$39.00 interest for 1 year	$\cancel{\$650} \times \frac{3}{\cancel{6}} \times \frac{1}{2} = \19.50
\$19.50 interest for 6 months	interest

How was the interest for 6 months found in A? In B
we changed the rate to ____ and the months to a frac-
tional part of a year. Then we ____ the principal by the
____ and by the ____.

Without pencil.

*In the following examples, change the months to frac-
tional parts of a year. Reduce fractions to lowest terms:*

	(a)	(b)	(c)	(d)	(e)
1.	3 mo.	2 mo.	7 mo.	4 mo.	5 mo.
2.	11 mo.	8 mo.	9 mo.	6 mo.	10 mo.

3. Find the interest for the sums indicated:

<i>Principal</i>	<i>Rate</i>	<i>Time</i>	<i>Principal</i>	<i>Rate</i>	<i>Time</i>
(a) \$300	6%	4 months	(d) \$800	6%	8 months
(b) \$500	6%	6 months	(e) \$600	5%	2 months
(c) \$400	5%	6 months	(f) \$200	4%	9 months

With pencil.

4. If I borrow \$250 for 8 months at 6%, how much interest must I pay?

5. If I borrow \$1200 for 9 months at 6%, what amount will I owe at the end of the 9 months?

6. Mr. Ford obtained a loan of \$480 from his bank at 6% for 8 months. How much interest did he pay when the loan was due?

7. A man borrowed \$7500 to start in business. At 6%, how much interest would he pay each half-year?

8. Compute the interest:

<i>Principal</i>	<i>Rate</i>	<i>Time</i>	<i>Principal</i>	<i>Rate</i>	<i>Time</i>
(a) \$4200	6%	6 months	(e) \$2100	3%	9 months
(b) \$2600	4%	6 months	(f) \$3500	4%	9 months
(c) \$2000	5%	3 months	(g) \$1243	6%	8 months
(d) \$3800	6%	6 months	(h) \$3740	5%	2 months

99. Interest for Years and Months

Mr. Williams borrowed \$460 at 6%. The loan was repaid at the end of 1 year and 6 months. How much interest did Mr. Williams pay on the loan?

$$\begin{array}{r} \$4.60 \\ \cancel{\$460} \times \frac{\overset{3}{\cancel{6}}}{\cancel{100}} \times \frac{3}{2} = \$41.40 \text{ interest} \end{array}$$

To find the interest for years and months, multiply the principal by the rate expressed as a fraction and by the time expressed as a fraction of a year.

1. A man borrowed \$1800 at 6%. The loan was repaid at the end of 2 years and 6 months. How much interest was paid on the loan?

2. In order to build a house, Mr. Smith borrowed \$8000 at 4%. (a) How much interest must be paid annually on this loan? (b) How much will Mr. Smith pay as interest if he keeps the money for 2 years 3 months?

3. Mr. Reid bought a house costing \$18,000. He paid \$5000 in cash. His bank loaned him the remainder, taking a mortgage on the house and charging interest at the rate of 6%. (a) How much interest was due each half-year? (b) How much interest would Mr. Reid pay on the loan in 3½ years?

4. Compute the interest:

<i>Principal</i>	<i>Rate</i>	<i>Time</i>
(a) \$1250	6%	1½ years
(b) \$1700	5%	2 years 2 months
(c) \$2150	4%	3 years 6 months
(d) \$900	6%	2¼ years
(e) \$400	5%	4 years 9 months
(f) \$1500	6%	2 years 4 months

100. General Problems in Interest

Without pencil.

1. What is the interest on \$500 (a) for 1 year at 6%? (b) For 6 months at the same rate?
2. What sum must be paid as interest on a loan of \$200 for 2 years (a) at 5%? (b) At 4%?
3. What is the interest on \$300 (a) for 6 months at 6%? (b) For 4 months? (c) For 9 months?
4. Principal, \$6000; time, 2 years; rate, 6%. What is the interest?

With pencil.

5. Mr. James borrowed \$8500 from the First National Bank to build a house. How much interest is due on the loan every six months, the rate of interest being 6%?

*6. Mr. Davis borrowed \$5000 on February 1, at the rate of 6%. (a) How much interest was due on August 1? (b) How much interest did Mr. Davis pay if the loan ran for a period of $3\frac{1}{2}$ years?

7. Mr. French loaned a friend \$2500 for 9 months at 6%. What amount did he receive when the loan was paid?

8. A county sold bonds amounting to \$250,000 to build new roads. The interest rate was 4%. How much interest was due every six months?

*9. I borrowed \$1250 on July 1, 1929, and paid back the sum with interest at 6% on January 1, 1930. What amount of money did I pay to settle the debt?

10. The Gotham Bank loaned Mr. Peters \$1500 for 8 months at 6%. At the expiration of the time, Mr. Peters settled the loan with a check for \$1560. Was that the correct amount?

11. William Andrews has \$250 on deposit in the Dime Savings Bank, which pays interest at the rate of 4%. How much interest would be credited to William's account at the end of 6 months?

*12. Earl had \$500 on deposit in the Colonial Savings Bank on January 1. On April 1, interest at the rate of 4% was added. How much did Earl then have to his credit at the bank?

13. What amount must the borrower return:

- (a) On a loan of \$9500 at 6%, for 6 months.
- (b) On a loan of \$6540 at 4%, for 2 years.
- (c) On a loan of \$1050 at 3%, for 2 years 3 months.
- (d) On a loan of \$870 at 4%, for 3 years 4 months.
- (e) On a loan of \$790 at 5%, for 3 years 6 months.
- (f) On a loan of \$1800 at 6%, for 1 year 4 months.

101. Formula for Computing Interest

To find the interest on any sum, multiply the principal by the rate expressed as a fraction and by the time expressed as years or part of a year.

This rule is sometimes expressed as follows:

$$\text{interest} = \text{principal} \times \text{rate} \times \text{time}$$

Using the initial letters only, we have:

$$i = p \times r \times t$$

We can shorten this still further and write:

$$i = prt$$

$I = prt$ is a short way of expressing the rule for interest. Let us apply the rule.

Mr. Francis borrows \$600 for 2 years at 4%. What is the total amount of interest to be paid for the use of the money?

$$i = prt$$

$$p = \$600$$

$$r = 6\%$$

$$t = 2 \text{ years}$$

$$\text{Hence, } prt = \overset{\$6}{\cancel{\$600}} \times \frac{6}{\cancel{100}} \times 2 = \$72$$

$$\text{Or, interest} = \$72$$

Write each of the following examples in a way that will show that you know how to use the rule $i = prt$. Then work the example. Thus, if one example read: "Find the interest on \$250 at 4% for 3 years," you would write:

$$i = \$250 \times \overset{p}{\frac{4}{100}} \times \overset{r}{3} = ?$$

1. Compute the interest on \$800 at 6% for 2 years.
2. Compute the interest on \$960 at 5% for 3 years.
3. Find the interest to be paid on a loan of \$450 at 6% for 2 years 6 months.
4. I borrowed \$500 at 6%. If I repaid the loan at the end of 1 year 8 months, how much interest was due?
5. Mr. Parker borrowed \$750 at 5% for 2 years 6 months. What was the amount of the interest on the loan for the entire period?
6. A business man borrowed \$200 for 3 months at 6% in order to take advantage of a large discount that was offered for cash payment of a bill. How much interest did he have to pay at the end of 3 months?

102. Step-by-Step Test Drill. — Application of Percentage. I

		A	B	C	D	E
1.	Cost Gain % Gain	\$12,000 10 ?	\$16,000 7 ?	\$2400 12 ?	\$6250 6 ?	\$5280 5 ?
2.	Cost Loss % Selling Price . . .	\$6500 12 ?	\$12,500 12 ?	\$8250 6 ?	\$7800 10 ?	\$9550 15 ?
3.	Amount of Sale . Commission Rate . Commission . . .	\$500 5% ?	\$1500 3% ?	\$9000 5% ?	\$1200 4% ?	\$1600 3% ?
4.	Amount of Sale . Commission % . . Commission . . .	\$9000 $\frac{1}{8}$?	\$7000 $\frac{1}{4}$?	\$6000 $\frac{1}{2}$?	\$5500 $\frac{3}{4}$?	\$6256 $\frac{1}{8}$?
5.	Selling Price . . . Commission Rate . Net Proceeds . . .	\$650 4% ?	\$7500 8% ?	\$1600 2% ?	\$800 5% ?	\$1200 3% ?
6.	Cost Gain Gain %	\$6000 \$500 ?	\$3600 \$900 ?	\$2500 \$250 ?	\$10,000 \$500 ?	\$20,000 \$4000 ?
*7.	Amount of Sale . Commission . . . Commission Rate .	\$1200 \$100 ?	\$1800 \$90 ?	\$500 \$20 ?	\$2500 \$50 ?	\$3600 \$300 ?
*8.	Loss Loss % Cost	\$600 25 ?	\$250 50 ?	\$375 20 ?	\$800 $33\frac{1}{3}$?	\$900 $12\frac{1}{2}$?
9.	Commission . . . Commission Rate . Amount Collected	\$200 5% ?	\$120 4% ?	\$800 2% ?	\$500 5% ?	\$600 3% ?

103. Step-by-Step Test Drill — Application of Percentage. II

		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1.	Principal Rate Time Interest	\$15,000 8% 1 yr. ?	\$25,000 6% 1 yr. ?	\$26,000 5% 1 yr. ?	\$8000 7% 1 yr. ?	\$12,000 5% 1 yr. ?
2.	Principal Rate Time Interest	\$10,000 6% 3 yr. ?	\$8500 4% 3 yr. ?	\$7500 8% 2 yr. ?	\$16,000 4% 4 yr. ?	\$19,000 6% 3 yr. ?
3.	Principal Rate Time Interest	\$6500 7% 9 mo. ?	\$7200 5% 4 mo. ?	\$8800 6% 6 mo. ?	\$950 6% 10 mo. ?	\$2100 4% 8 mo. ?
4.	Principal Rate Time Interest	\$1750 4% 2 yr. 6 mo. ?	\$8000 6% 1 yr. 9 mo. ?	\$1500 5% 1 yr. 4 mo. ?	\$5500 6% 2 yr. 6 mo. ?	\$8600 3% 7 yr. 8 mo. ?
5.	Principal Rate Time Amount	\$6000 4½% 2 yr. ?	\$8000 5½% 3 yr. ?	\$7600 12½% 2 yr. ?	\$6200 3½% 5 yr. ?	\$6800 4½% 4 yr. ?
*6.	Principal Rate Interest Time	\$1500 ? \$150 1 yr.	\$1800 ? \$90 1 yr.	\$7500 ? \$450 1 yr.	\$10,000 ? \$400 1 yr.	\$7500 ? \$500 1 yr.
*7.	Principal Rate Time Interest	? 12½% 1 yr. \$800	? 10% 1 yr. \$100	? 4% 1 yr. \$75	? 4% 1 yr. \$500	? 5% 1 yr. \$600

104. Problem Analysis

1. Before attempting to solve the problem, read it carefully.

2. Ask yourself:

(a) What facts are given?

(b) What am I to find?

(c) What is the first step? How shall I solve it?

(d) What is the next step? How shall I solve that?

(e) Are there any more steps?

(f) What is a reasonable answer?

3. Work the problem step by step. Check your answer.

1. A farmer's wife sold 18 lb. of butter at the market. She received 42¢ a pound. She bought 5 cans of corn at 23¢ a can and 2 bags of flour at \$2.60 each. The remainder of the amount due her she took in cash. How much cash did she receive?

2. Gasoline is selling at an average price of 22.5¢ a gallon. Two years ago the average price was 18.5¢. What would the increase amount to on 1200 gal.?

3. It is 1052.7 mi. from Fort Worth to Chicago. How long will it take to make the trip on a train that averages 48.4 mi. an hour?

4. A one-way ticket by airplane between Boston and Newark costs \$34.85. The round-trip ticket costs \$64.70. What is saved by buying the round-trip ticket if you intend to return?

5. A one-way ticket by air between New Orleans and Chicago costs \$182. If the round-trip ticket is 10% less than the single ticket each way, for what is it sold?

6. A plane leaving Fort Worth at 8 A.M. reaches Houston, which is 279 mi. distant, at 11 A.M. What is the average mileage per hour?

7. The air-mail rate from Miami to Havana is 5¢ for each half-ounce. How much postage is needed for a package weighing 8 oz.?

*8. Mr. Martin bought an automobile for \$1500. Two years later he traded it in for another car that cost \$1850. He gave the dealer his old car and \$1275. What per cent of the cost of the old car was he allowed?

9. A clerk sold an article for \$245. He billed the customer for \$2.45. How much loss would this mean to the firm?

10. Mr. Todd allows \$500 a year for clothing for his family. This is 16% of his salary. What is his salary?

11. How much will it cost to cement the floor of a cellar measuring 18 ft. by 22 ft. at \$.60 a square foot?

12. A six-passenger plane flying between Denver and El Paso carried 2 through passengers and 4 from Denver to Santa Fe. At Santa Fe 4 passengers were taken aboard, who completed the trip to El Paso. (a) What was paid in fare on this plane if a ticket from Denver to El Paso is \$67.50, one from Denver to Santa Fe is \$39, and one from Santa Fe to El Paso is \$32.50? (b) How much more or less is this than the fare paid by 6 through passengers?

13. At 16¢ per 100 cu. ft. of water, what does the city receive for 25,650 cu. ft.?

14. The wages for a plasterer in one year amounted to \$2400. A carpenter earned \$2000 the same year. (a) How much greater was the income of the plasterer? (b) What per cent was this of the carpenter's income?

105. Supplying the Question

Example: Sarah paid \$45.50 for a coat. Jane waited for the sales and bought a similar coat at a reduction of 20%.

Possible questions to complete the example:

- (a) What did Jane pay for her coat?
- (b) How much less did Jane pay for her coat?
- (c) What part of the regular price was the reduction?

Complete each problem by supplying a question. Then solve the problem:

1. Mrs. Brown gave the butcher a five-dollar bill in payment for 8 lb. of ham at \$.38 a pound.

2. Mr. Dodd's speedometer registered 6248.5 mi. when he started on his trip. At the end of the first day it registered 6426.2 mi. At the end of the second day it registered 6600.8 mi.

3. An automobile traveled 28.2 mi. the first hour, 25.4 mi. the second hour, and 26.5 mi. the third hour.

4. Fred found that his car averaged 16.2 mi. to the gallon. Gasoline sells for \$.22 a gallon. Fred used 10 gal.

5. A cubic foot of water weighs 62.5 lb. A cubic foot of ice weighs .92 times as much as a cubic foot of water.

6. Three packages weighed as follows: $26\frac{1}{2}$ lb.; $18\frac{3}{4}$ lb.; $27\frac{5}{8}$ lb.

7. A rug measures $8\frac{1}{4}$ ft. by $10\frac{1}{2}$ ft.

8. Anna paid \$4.50 for $2\frac{1}{2}$ doz. favors for her party.

9. Lester sold a bicycle that cost him \$40 at a loss of 30%.

10. Mr. Thomas borrowed \$1600 for 2 years at 5%.

106. Approximating Answers

Example: A real-estate agent sold a house for a client for \$12,500. He charged the owner 4%. What was his commission?

\$400

\$500

\$125

\$600

Think: $1\% = \$125$ $4\% = 4 \times \$125 = \500

In the following problems you are to select from the four answers the one which is right:

1. A suit was bought at a sale for \$48. This was 80% of the regular price. What was the regular price?

\$60

\$75

\$70

\$50

2. Mrs. Field bought 3 blankets at a sale. They were marked down $\frac{1}{3}$ from the regular price, which was \$9 each. What did she pay for them?

\$27

\$18

\$12

\$6

3. A dealer sold 150 T. of coal at \$14.50 a ton and 150 T. at \$15 a ton. What did he receive for the coal?

\$4200

\$4800

\$4425

\$2250

4. The distance between two cities is 625.6 mi. If it takes a train 16 hr. to make the trip, what is the average mileage per hour?

41.5 mi.

400 mi.

25 mi.

39.1 mi.

5. A man's wages amounted to \$44 for $5\frac{1}{2}$ days' work. What was his average daily wage?

\$10

\$9

\$22

\$8

107. Selecting the Operation

Select the right solution from the three suggested and write it after the number of the problem on a sheet of paper:

1. A man bought a horse for \$175 and sold it for 20% less than he paid for it. What was the selling price?

$$\$175 - \$20 \quad \frac{1}{5} \text{ of } \$175 \quad \$175 - (20\% \text{ of } \$175)$$

2. A man bought milk for 40¢ a gallon and sold it at 15¢ a quart. What was the rate of gain?

$$\frac{15}{40} = \frac{3}{8} = 37\frac{1}{2}\% \quad (4 \times \$.15) - \$.40, \frac{20}{40} = 50\% \\ \$.40 + .15 = 55\%$$

3. At 90¢ a pound, what will 8 oz. of tea cost?

$$$.90 \div 8 \quad 8 \times $.90 \quad \frac{1}{2} \text{ of } $.90$$

4. John raised 500 chickens. He sold 75% of them to the butcher. How many had he left?

$$75 \times 500 \quad \frac{3}{4} \times 500 \quad \frac{1}{4} \times 500$$

5. Find the cost of 5500 lb. of hay at \$22 a ton.

$$5000 \times \$22 \quad 2\frac{3}{4} \times \$22 \quad 5 \times \$22$$

6. Mr. Sims sold some hay at the rate of \$20 a ton. His bill was \$70. How many tons did he sell?

$$\$20 \div \$70 \quad \$20 \times \$70 \quad \$70 \div \$20$$

7. What will 15,000 shingles cost at \$6 per thousand?

$$15,000 \times \$6 \quad 15 \times \$6 \quad 150 \times \$6$$

8. What is the average mileage per gallon of gasoline if one can travel 162.5 mi. on 10 gal.?

$$10 \times 162.5 \quad 162.5 - 10 \quad 162.5 \div 10$$

108. Changing the Wording of Problems

Example: A dealer bought an article for \$75. He was forced to sell it for \$60. What was the per cent of loss?

(a) An article that is bought for \$75 and sold for \$60 is sold at a loss of ____%.

(b) What is the per cent of loss on an article which is purchased for \$75 and sold for \$60?

Vary the wording of the following problems in as many ways as possible:

1. Mr. Ellis paid \$2400 for an automobile which he sold at a loss of 25%. What was his loss?

2. At a clearance sale an article marked \$50 was sold for \$25. What was the per cent reduction?

3. How many square feet are there in a plot of ground 28.5 ft. long and 24.6 ft. wide?

4. A motor boat which averages 28.4 mi. an hour will travel ____ miles in 6 hr. if it continues at the same rate.

5. John had 18 examples right out of 25. What per cent should he receive?

6. Alice finds that her car averages 12.8 mi. to the gallon of gasoline. How far will she travel on 10 gal.?

7. A farmer sold half his crop of potatoes in the fall at \$1.75 a bushel. He held the remainder until spring and had to sell at \$1.40 a bushel. What was the rate of loss through holding his crop?

8. What is the rate of commission on a sale amounting to \$2500 if the agent's fee is \$250?

9. Find the interest on a loan of \$16,500 at 6% for 12 months.

109. Problems without Numbers

In each of the following, tell how you would solve the problem. Then supply reasonable figures for the missing numbers and find the answer:

1. Mr. Miller bought a house for _____. He spent _____ for repairs and then sold the house for _____. What was the per cent gain?

2. What must James pay for a railroad ticket if the distance is _____ miles and the cost _____ per mile?

3. A merchant sold a coat that cost _____ so as to gain _____%. What was the selling price?

4. Mr. Weed borrowed _____ for _____ years at _____%. What did he pay in interest?

5. A man sells goods on commission. He charges _____%. What will he receive if the sales amount to _____?

6. What must he pay for _____ cubic feet of gas at \$1.20 per thousand?

7. William earned _____ while in college. His expenses amounted to _____. What per cent of his expenses did he earn?

8. An agent received _____ for selling a house. This amounted to _____% of the selling price. What was the selling price?

9. On a recent automobile trip Mr. Williams averaged _____ miles per hour. How long did it take him to travel _____ miles?

10. Mary left the Grand Central Station at _____ and reached her destination at _____. If the average speed of the train was _____ miles per hour, how far did she travel?

110. Silent Reading of Problems

After each problem you will find a question followed by four answers. Select the correct answer:

1. Which is cheaper: to buy 50 lb. of sugar in five-pound cartons at 30¢ each, or to buy a fifty-pound sack for \$2.50? How much cheaper is it per pound?

Which of the following facts are given?

- (a) The cost per pound of sugar.
- (b) The number of cartons.
- (c) The price of a fifty-pound sack.
- (d) The difference in price per pound.

2. It takes Dan $12\frac{4}{5}$ sec. to run the 100-yard dash. Bob can run it in $12\frac{1}{2}$ sec. How much faster is Bob's time than Dan's?

Which of the following are you asked to find?

- (a) The difference in time.
- (b) The average time.
- (c) The total distance run by the two boys.
- (d) The total time made by the two boys.

3. Mr. Davis bought gasoline at a service station last year at an average price of 22.5¢ a gallon. This year the average price is 24.2¢. How much difference will this make in the expense of running a car if he uses 275 gal.?

Which of the following are you asked to find?

- (a) The difference in cost per gallon.
- (b) The average mileage per gallon.
- (c) The cost per year.
- (d) The difference in cost for 275 gal.

4. Mary picked berries in the summer to earn money. She sold 3 crates containing 24 quart boxes each at 18¢ a quart. What price did she get for her berries?

Which of the following facts are given?

- (a) The number of quart boxes she sold.
- (b) The selling price of a quart box.
- (c) The cost per crate.
- (d) The time she worked.

5. Canned peaches sell regularly at 29¢ a can and 3 for 70¢ at a sale. How much do you save by buying 3 cans at the sale rather than one can at three different times?

Which of the following are you asked to find?

- (a) The cost of 3 cans bought one at a time.
- (b) The cost per can when bought at a sale.
- (c) The saving on 3 cans when bought at a sale.
- (d) The cost of 6 cans.

6. Jack's father needs 2 new tires for his truck. The regular price is \$36 a tire with a discount of 15% for cash. What will the tires cost him?

Which of the following facts are given?

- (a) The price paid by Jack's father.
- (b) The cost of 2 tires.
- (c) The selling price of the tires.
- (d) The rate of discount allowed for cash.

111. Our Ball Team

Public School 50 is very proud of its baseball team. It has played 10 games this year and has lost only 2 games. The boys and girls have computed the per cent of games won as follows:

games won

games played

$\frac{8}{10}$

$= 80\% = .80$

You see how easy it is to figure this out. It is just the second case of percentage.

Public School 44 has played 9 games and won 6. Its standing is $\frac{6}{9} = 66\frac{2}{3}\% = .66\frac{2}{3}$.

In a newspaper the “Standing of the Clubs” is carried out to three decimal places; any fractions remaining are dropped. Public School 44 would rank thus: .666. Public School 50 would rank .800. When we express athletic standing in three decimal places, it isn’t really a “per cent” although many newspapers call it that.

112. Problems

1. Our school league standing ended as follows:

	<i>Played</i>	<i>Won</i>	<i>Lost</i>
Lincoln	12	8	4
Garfield	10	4	6
Roosevelt	12	6	6
McKinley	10	6	4
Washington	12	4	8

Calculate the standing of each team and arrange the teams according to their standing, the highest one first.

2. The final standing of the 8 National League teams in 1927 was as follows:

	<i>Won</i>	<i>Lost</i>		<i>Won</i>	<i>Lost</i>
Pittsburgh	94	60	New York	92	62
St. Louis	92	61	Brooklyn	65	88
Philadelphia	51	103	Cincinnati	75	78
Boston	60	94	Chicago	85	68

Calculate the standing of each team and arrange the teams according to their standing, the highest one first.

113. Studying a Time-Table

This time-table shows a section of the time-table or schedule under which trains are running from Chicago to points West.

No. 9 Daily	No. 19 Daily	No. 13 Daily	Miles	Table 9	No. 8 Daily	No. 14 Daily	No. 2 Daily	No. 24 Daily
PM	AM	AM		Mountain Time	PM	PM	AM	AM
3.30	9.40	5.40	991.2	Lv.. LA JUNTA 3, 4, 5..Ar	4.10	9.00	1.50	3.35
.....		f 6.10	1008.8	Lv.....Timpas.....Ar	f 3.40	8.26	.....	.....
.....		f 6.20	1014.4	Lv.....Ayer.....Ar	f 3.30	8.17	.....	.....
.....		f 6.35	1022.3	Lv.....Bloom.....Ar	f 3.18	8.04	.....	.....
.....		f 6.52	1031.7	Lv.....West.....Ar	.....	f 7.49	.....	.....
.....		7.02	1036.3	Lv.....Thatcher.....Ar	f 2.56	f 7.41	.....	.....
.....		f 7.10	1040.9	Lv.....Simpson.....Ar	f 2.48	f 7.32	.....	.....
.....		f 7.37	1054.7	Lv.....Earl.....Ar	.....	f 7.12	.....	.....
.....		f 7.53	1062.6	Lv.....Hoehnes.....Ar	f 2.14	6.57	.....	.....
.....		f 8.04	1068.7	Lv.....El Moro.....Ar	.....	f 6.48	.....	.....
*5.35	11.40	*8.15	1073.0	Ar....TRINIDAD...Lv	1.55	6.40	11.45	1.20

Note that in this time-table the mileage at La Junta is given as 991.2. This is the distance of La Junta from Chicago. If the mileage had been reckoned from La Junta, it would read 0.0.

If you are going from La Junta to Trinidad, *read down* the section of the time-table at the left. If you are traveling from Trinidad to La Junta, *read up* the section at the right. What does A.M. mean? What does P.M. mean?

1. How many trains leave La Junta during the day? Which one leaves earliest? Which is the last train out of La Junta?
2. If you want to get to Trinidad a little before noon which train should you take?
3. Which are express trains? Which are local?
4. The “f” before the local stop means “flag stop.” What is a “flag stop”?
5. How long does it take to get to Trinidad on the local train?

6. How many trains arrive in La Junta during the day?
7. Which train makes the best time from Trinidad to La Junta?
8. William wishes to go from Trinidad to West. Which train must he take? Why?
9. How far is Trinidad from La Junta?
10. Nellie got on the train at Simpson. She was going to Trinidad. At \$.035 a mile, what did she have to pay for her ticket?

114. Traveling by Airplane

The first settlers in America came to these shores in sailboats. People of Revolutionary times traveled by stage or coach. Then in turn came the steamboat, the steam engine, the automobile, the great ocean liners, and the airplane.

You know, of course, that sending mail by air is a regular part of the United States Postal System.

Did you know that regular travel service through the air is so general that the companies have time-tables showing time, distance, and connections between cities all over the United States and the West Indies?

NORTHBOUND Read Down				Twelve-Passenger Multi-Motored Cabin Planes	SOUTHBOUND Read Up		
Daily	Ex. Sun.	Daily	Miles	TABLE 16 Pacific Standard Time	Daily	Ex. Sun.	Daily
AM	AM	PM			AM	PM	PM
9.00	10.00	4.00	0	Lv Los Angeles (Gd. Cen. Air Term.)	Ar	10.45	1.45
Thru Service	11.00	5.00	110	Ar.....Bakersfield.....	Lv	9.45	12.45
	11.00	5.15	110	Lv.....Bakersfield.....	Ar	9.40	12.45
	12.00	.....	220	Lv.....Fresno.....	Lv	.....	11.45
	.....	7.45	370	Ar..Oakland Municipal Airport....	.....	.....	.....
	12.00	1.30	380	Ar.....Alameda Airport.....	Lv	7.20	10.15
M	PM	PM			AM	AM	PM

On page 153 is a time-table of one of the air lines. Notice that it is like the railroad time-table except that the distances between cities are much greater.

1. In which direction will you read going from Los Angeles to Alameda? Why?

2. In which direction will you read going from Alameda to Los Angeles? Why?

3. How many planes leave Los Angeles in the morning? How many leave in the afternoon?

4. How many planes leave Alameda for Los Angeles during the day?

5. Which plane leaving Alameda reaches Los Angeles before noon?

6. What does "Thru Service" mean?

7. How many express planes are there in each direction?

8. What is the distance between Alameda and Los Angeles?

9. How far is it to Fresno from Los Angeles? From Fresno to Alameda?

10. How long does it take to go from Los Angeles to Alameda by the plane leaving at 9 A.M.?

11. Which northbound plane stops at Bakersfield for a quarter of an hour?

12. Find the length of time it takes each plane to make the trip from Alameda to Los Angeles.

13. Find the mileage per hour for each plane.

14. The plane leaving Los Angeles for Alameda at 10 A.M. carried 5 through passengers who paid a fare of \$32.50 each. It carried 7 passengers to Fresno who paid \$20 each. At Fresno it took on 7 passengers for Alameda who paid \$15 each. What was the total fare collected on this trip?

115. Problems on Airplane Travel

1. An airplane leaving Cleveland at 12.30 p.m. reaches Washington at 3.30 p.m. (a) How long does it take to make the trip? (b) What is the average mileage per hour if the distance is 236 mi.?
2. A plane leaving Oakland at 4.45 p.m. reached San José at 5.10 p.m. The distance is 40 mi. (a) What is the average speed per minute? (b) What would be the average hourly speed?
3. (a) Mr. Perkins left Boston by airplane at 4 p.m. and reached Newark at 6 p.m., a distance of 201 mi. What was the average mileage per hour? (b) His ticket one way cost \$34.85. What was the average cost per mile? (2 decimal places.)

SOUTHBOUND Read Down		Eight-Passenger Cabin Planes		NORTHBOUND Read Up	
Daily	Miles	TABLE 10 Central Standard Time		Daily	
9.00 AM	0	Lv.	Chicago	Ar	2.58 PM
11.56 AM	252	Ar.	St. Louis	Lv	12.03 PM
12.23 PM	.....	Lv.	St. Louis	Ar	11.40 AM
3.17 PM	500	Ar.	Memphis	Lv	9.00 AM

4. Mrs. Graham studied this time-table to find how long it would take her to make the trip from Chicago to Memphis. (a) At what time would she leave Chicago? (b) When would she reach Memphis? (c) How long would it take her? (d) What distance would she travel? (e) How long would she stop at St. Louis?
5. What is the average mileage per hour of the plane in which Mrs. Graham intended to travel? (2 decimal places)
6. Make up another problem about a trip from Memphis to Chicago.

7. (a) The distance by airplane between Toronto, Canada, and Buffalo, New York, is 100 mi. At \$15 for a one-way ticket, what is the cost per mile? (b) A round-trip ticket costs \$25. How much is saved by purchasing a round-trip ticket? (c) What is the cost per mile at the lesser rate?

8. Mr. Roberts left New York for Montreal by airplane at 7 A.M. He reached his destination at 11.15 A.M. (a) How long did it take him to make this 334-mile trip? (b) What was the average mileage per hour?

116. Using a Ticket Schedule

John’s father is a clerk in the ticket office of an airplane company which runs a fleet of planes between Albany and Cleveland.

One-Way Between	Cleveland	Buffalo	Rochester	Syracuse	Utica	Schenectady
Buffalo.....	\$25.00	.....	.....	.....	.....	.....
Rochester.....	32.00	\$15.00	.....	.....	.....	.....
Syracuse.....	43.00	25.00	\$15.00	.....	.....	.....
Utica-Rome.....	50.00	30.00	25.00	\$15.00	.....	.....
Schenectady.....	55.00	35.00	30.00	25.00	\$15.00	.....
Albany.....	60.00	40.00	35.00	30.00	20.00	\$7.00

This is the schedule on which he bases the charge to passengers. Notice that the schedule gives the fare between cities.

John wished to learn how to read the schedules. His father explained it as follows:

“Today a passenger wished to go from Schenectady to Cleveland. I charged him \$55. If I hadn’t known the rate, I would have looked down the left-hand column for Schenectady and then across until I came to the vertical column with Cleveland at the top.”

He then asked John to find the fare between Schenectady and Utica. John said \$15. Was he right?

“Now try to find the fare between Schenectady and Albany.”

John tried to find it as he had the other but could not because there was no vertical column headed “Albany.”

1. Can you find the answer to John’s problem?

2. Find the cost of a one-way ticket (*a*) between Buffalo and Cleveland; (*b*) between Rome and Rochester; (*c*) between Albany and Syracuse; (*d*) between Rochester and Syracuse.

3. Plane A accommodates 6 passengers. What will be the revenue from this plane if it is loaded to capacity with passengers making the trip from Albany to Cleveland?

*4. Plane B is also a six-passenger plane. It carried 4 passengers from Albany to Buffalo, 2 from Albany to Cleveland, and 4 from Buffalo to Cleveland. (*a*) How many passengers alighted from the plane at Cleveland? (*b*) Which plane, A or B, earned more in fares? (*c*) How much more did it earn?

117. Parcel Post

While Henry and his mother were in the country this summer, they learned to like the farm and the good food they had. Henry’s mother thought it would be fine if they could have fresh eggs from the farm all winter through. Henry couldn’t see how the farmer could get the eggs to them except by sending them to their grocer in New York. But the farmer laughed and showed him a little metal box just large enough to hold a dozen eggs. He told Henry that he could send the eggs in the box by

mail. In this way Henry learned that the United States Government has a way of sending packages by mail. This is called the Parcel Post System. Mail sent in this way is ranked as fourth-class mail. The farmer explained that the government charges for the weight of the package and for the distance it is carried. The rates are as follows:

<i>Zones</i>	<i>Distance</i>	<i>First Pound</i>	<i>Additional Pounds</i>
Local		7¢	1¢ for each 2 pounds
1	Up to 50 miles	7¢	1¢ for each pound
2	50 to 150 miles	7¢	1¢ for each pound
3	150 to 300 miles	8¢	2¢ for each pound
4	300 to 600 miles	8¢	4¢ for each pound
5	600 to 1000 miles	9¢	6¢ for each pound
6	1000 to 1400 miles	10¢	8¢ for each pound
7	1400 to 1800 miles	12¢	10¢ for each pound
8	Over 1800 miles	13¢	12¢ for each pound

Limit of size: 84 inches in length and girth combined.

Limit of weight: 70 pounds in Zones 1, 2, and 3 and 50 pounds in all others. A fraction of a pound is counted as another pound.

Insurance rates: For a valuation up to and not exceeding \$5, the fee is 5¢; above \$5 and not over \$25, 8¢; above \$25 and not over \$50, 10¢; above \$50 and not over \$100, 25¢.

Return receipts for domestic insured parcels may be obtained upon request and payment of 3¢ for each receipt.

The farmer told Henry's mother that he would supply eggs through the year by parcel post at 50¢ a dozen if she would pay mailing charges. Henry decided to find what this would cost. He got a map and calculated that

the farm was 80 miles from his home. He found that the case weighed half a pound and the eggs $1\frac{1}{2}$ pounds. The postage was therefore 8 cents. This is the way in which he found it:

Weight of case and	Rate for first pound	= 7¢
eggs = 2 lb.	Rate for second pound	= 1¢
	Total	<u>8¢</u>

1. A parcel weighing 10 lb. was sent to Zone 4. What was the postage?

2. A box weighing 25 lb. was sent to Zone 3. What was the postage?

3. What was total cost of sending a package weighing 18 lb. to Zone 5, if it was insured for \$25?

4. A merchant sends 12 pkg. weighing 4 lb. each to Zone 2. He insures each package for \$10. What will the entire shipment cost him?

5. Henry sends a box weighing 4 lb. to a friend 1200 miles away. He insures the box for \$12. What are his total mailing charges?

6. A mail-order house sends its goods by parcel post. Find the total cost of postage and insurance on each of the following shipments:

<i>Number of Packages</i>	<i>Weight</i>	<i>Value</i>	<i>Zone</i>
72	5 lb. each	\$10	2
15	12 lb. each	\$25	4
140	8 lb. each	\$50	5
43	27 lb. each	\$25	3
164	16 lb. each	\$100	1

118. How to Send Money

Henry’s mother decided to pay the farmer every four weeks for the fresh eggs which she got from him weekly. Since the farmer had agreed to charge 50¢ a dozen for the eggs all winter, \$2.00 for eggs and 32¢ for postage had to be sent him every four weeks. Because his mother had no bank account, Henry wondered how the farmer would get the money. His mother could, of course, send the money in an envelope, but it might easily be lost. His mother then explained that the United States Government offers a way to send money by mail. Money orders are purchased by the sender at a rate varying with the amount. You go to the post office and fill out a blank, handing it to the clerk with the money to be sent. The clerk then gives you an order on the postmaster of the town to which the money is to go. This order shows the name of the person to whom the money is to be paid. You then mail the order to that person. When he receives it, he takes it to his post office and obtains the amount indicated.

No money order may be made for more than \$100. What would you do if you wanted to send \$150?

The fees or charges for money orders are as follows:

<i>Amount</i>	<i>Fee</i>	<i>Amount</i>	<i>Fee</i>
Up to \$2.50	5¢	\$20.01 to \$40.00	15¢
\$2.51 to \$5.00	7¢	\$40.01 to \$60.00	18¢
\$5.01 to \$10.00	10¢	\$60.01 to \$80.00	20¢
\$10.01 to \$20.00	12¢	\$80.01 to \$100.00	22¢

From this table you can see that it cost Henry’s mother 5¢ a month to pay for the money order she was sending.

119. Problems

Without pencil.

How much will a postal money order for each of the following amounts cost? (Cost = amount of order + fee.)

- | | | | | |
|-----------|---------|---------|------------|-------------|
| 1. \$2.50 | 3. \$25 | 5. \$96 | 7. \$82 | 9. \$43.25 |
| 2. \$2.75 | 4. \$70 | 6. \$79 | 8. \$17.50 | 10. \$68.40 |

With pencil.

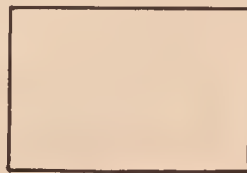
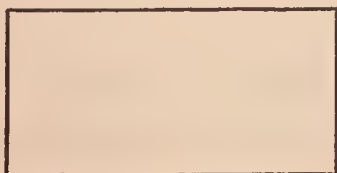
11. What postal money orders would you buy, and what would be the fee for sending (a) \$130.50? (b) \$209.85? (c) \$149.80?

12. A man buys money orders for \$50, \$85, \$25.20, \$75, and \$46. How much would he save by sending checks for these amounts?

*13. If you had to send \$110 by money order, which would be cheaper: (a) to buy 2 orders for \$100 and \$10, or (b) to buy 2 orders for \$55 each?

120. Right Angles and Rectangles

Most objects with which we deal in a schoolroom, such as books, paper, tops of desks, blackboards, doors, and windows, have four square corners. They are shaped like this:



We call such forms *rectangles*. The square corners are called *right angles*. Unless the four angles are right



angles, the figure is not a rectangle. If the four sides of the figure are equal, it is called a *square*. A square is a rectangle that has four equal sides.

The area of a rectangle is easy to determine. Here is one 5 units long by 2 units wide. You can see from the diagram that there are 5 square units in each row and that there are 2 rows of such units.

Therefore, the area of this rectangle is 10 square units (2×5 square units = 10 square units). The area



of any rectangle is equal to the number of units in its length multiplied by the number of units in its width.

$$\text{Area} = \text{length} \times \text{width}$$

The length is also known as the *base* of the rectangle, and the width is also known as the *height*; we may therefore say that

$$\text{Area} = \text{base} \times \text{height}$$

or, using letters,

$$A = b \times h$$

(Learn to use letters in expressing your formulas or ways of doing arithmetical processes. It will help you in your work later.)

Find the area, in square feet, of rectangles having the following dimensions:

1. 12 ft. by 15 ft.

2. 43 ft. by 36 ft.

3. 25 ft. by 40 ft.

4. $56' \times 20'$

5. $17' \times 29'$

6. $16'6'' \times 32'8''$

7. 45 ft. by 15 ft. 4 in.

8. 35 ft. by 24 ft.

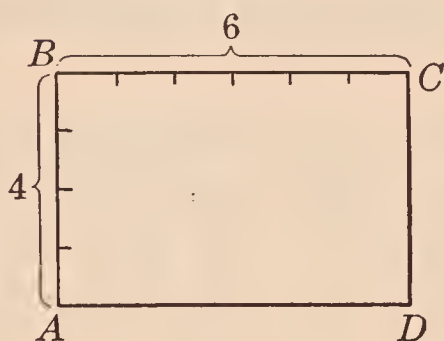
9. $b = 12$ ft.; $h = 6\frac{1}{2}$ ft.

10. $b = 37$ ft.; $h = 96$ ft.

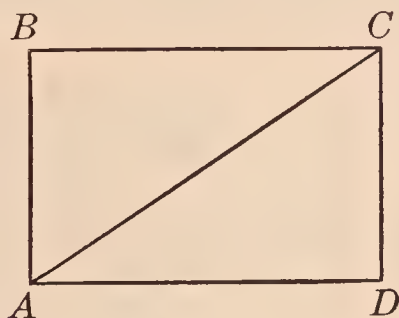
121. Area of a Right Triangle

Here we have a rectangle with a height of 4 units and a base of 6 units. Its area is 24 square units because

$$b \times h = A, \text{ or } 6 \times 4 = 24.$$



If we draw a diagonal line from A to C, dividing the rectangle into two parts, so that it looks like this, and



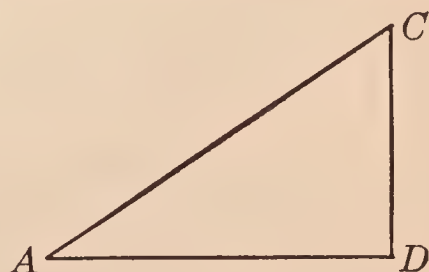
place one of these parts on top of the other, matching the sides and angles, we shall find that the two parts are equal.

Each one is one-half of the rectangle, and each therefore has an area of 12 square units.

Note carefully these new names for the sides:

The side AD is called the *base*.

The side CD is called the *height* or *altitude*.



The three-sided figure is called a *triangle*, and because it has one square corner, or right angle, it is called a *right*

triangle. Its area is equal to one-half the product of the number of units of length in the base by the number of units of length in the altitude.

$$\text{Area of a triangle} = \frac{1}{2} \text{ of } (\text{base} \times \text{altitude}) \text{ or } A = \frac{b \times a}{2}$$

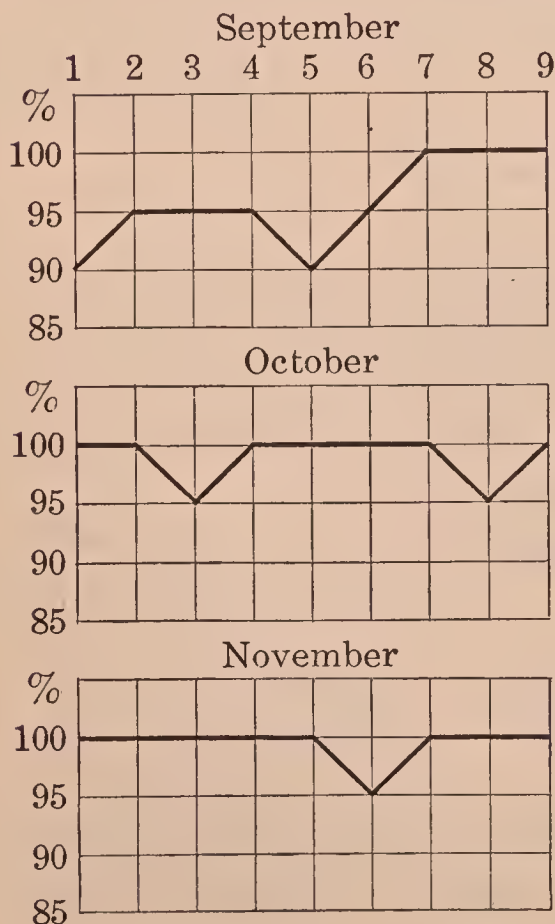
Find the area of triangles having the following dimensions:

1. $b = 9$ yd.; $a = 3$ yd.
2. $b = 150$ yd.; $a = 79$ yd.
3. $b = 225$ yd.; $a = 64$ yd.
4. $b = 20\frac{1}{2}$ ft.; $a = 16$ ft.

5. $b = 30\frac{2}{3}$ yd.; $a = 66$ yd.
6. $b = 210$ ft.; $a = 96$ ft.
7. $b = 12$ ft. 9 in.; $a = 15$ ft.
8. $b = 7$ yd. 2 ft.; $a = 3$ yd. 1 ft.

122. Keeping a Record of Progress

Walter finds that if he keeps a record of his progress he works much harder.



In the front of his spelling book he keeps a graph on which he records the per cent he gets in each lesson.

This diagram shows his record for three months for nine lessons. Notice that each month starts a new record. His aim is to keep a straight line at the 100% mark. At the left side in the vertical column he has listed the per cents. On the horizontal line at the top he has placed the number of each lesson. To draw the line of progress for September, Walter said that:

(1) He found the horizontal line showing the per-cent rating.

(2) He found the vertical line with the lesson number.

(3) He placed a dot where these lines crossed to show his standing for the first lesson.

(4) For the second lesson he found the per cent on the horizontal line.

(5) Then he found vertical line for the second lesson.

(6) At the place where the per-cent line crossed the lesson line he placed a dot.

(7) Then he connected the dot at 90% with the one at 95%.

(8) Each day after that he located the per cent on the lesson line and connected the new point with the preceding lesson.

1. Study the part of each graph that is shown and answer these questions:

(a) What was Walter's lowest rating?

(b) When did he receive it?

(c) For how many lessons in September had he 100%?

(d) For how many lessons had he 95% in October?

(e) On which lesson did he drop to 95% in November?

(f) In which month does the graph show the best work?

2. What kind of graph did Walter use to show his progress?

3. Should you like to keep a graph similar to this to show your progress in some subject? Try it. You'll be interested in seeing yourself improve, just as Walter did.

123. Using the Bar Graph in Geography

Often we wish to make comparisons between countries in our study of geography. We can read figures and get the desired information, but if we can make a picture showing the relationship, we understand it better and we can make others understand it better.

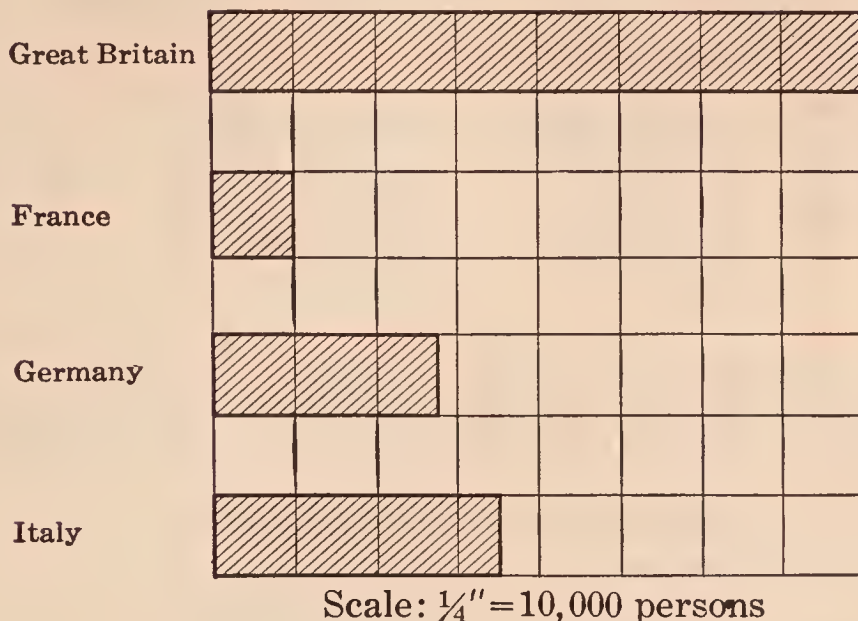
If you know how to make a bar graph, you can make such a picture. Let us suppose that we wish to show that immigration to the United States from certain countries in 1927 was as follows:

<i>Country</i>	<i>Immigrants</i>
Great Britain	80,000
France	10,000
Germany	28,000
Italy	35,000

First of all, we must decide upon the scale to which the bars are to be drawn. For this graph, let us allow a quarter of an inch for each 10,000 persons. Using this scale, the lengths of the bars representing the various countries will be as follows:

Great Britain	$\frac{80,000}{10,000} \times \frac{1}{4} = 2$ inches
France	$\frac{10,000}{10,000} \times \frac{1}{4} = \frac{1}{4}$ inch
Germany	$\frac{28,000}{10,000} \times \frac{1}{4} = \frac{7}{10}$ inch
Italy	$\frac{35,000}{10,000} \times \frac{1}{4} = \frac{7}{8}$ inch

The completed graph will then look like this:



1. Make a bar graph comparing the populations of the following cities. Expressed in round numbers, the populations are:

New York 6,000,000
 London 7,500,000
 Paris 3,000,000

Berlin 4,000,000
 Vienna 2,000,000

Represent 1,000,000 population by a bar $\frac{1}{2}$ in. long.

2. The area of New York State is about 50,000 sq. mi. Construct a bar graph comparing it with the areas of the following countries, which are approximately:

Great Britain	120,000 sq. mi.
Germany	180,000 sq. mi.
France	210,000 sq. mi.
Italy	120,000 sq. mi.

Use a bar 1 in. long to represent the area of New York State.

3. Construct a bar graph to show the value of exports from the United States to certain European countries, using the following figures:

Great Britain	\$900,000,000
France	\$280,000,000
Germany	\$380,000,000
Italy	\$175,000,000

4. Construct a bar graph to show the relative value of the exports of the following countries to the United States:

Great Britain	\$350,000,000
France	\$150,000,000
Germany	\$150,000,000

5. Illustrate with a bar graph the coal production of the following countries:

United States	650,000,000 T.
Great Britain	309,000,000 T.
France	42,000,000 T.
Germany	200,000,000 T.

6. Using a bar graph, compare the populations of the following cities:

Shanghai	1,500,000	Alexandria	440,000
Peiping	1,300,000	Cairo	800,000
Calcutta	1,200,000	Cape Town	210,000
Tokyo	2,100,000	Algiers	210,000
Vladivostock	100,000	Tangiers	50,000

7. From your geography get information that will enable you to compare the populations of the following countries: Japan, China, India, Turkey.

8. Compare graphically the areas of China, Japan, India, and Turkey.

124. Standard Weights of a Bushel¹

Wheat	60 lb.	Potatoes	60 lb.
Corn	56 lb.	Beans	60 lb.
Barley	48 lb.	Rice	45 lb.
Oats	32 lb.	Alfalfa	60 lb.

Use pencil if needed.

1. If potatoes are selling at \$1.25 for a hundred-pound sack, what is a bushel worth?

2. A farmer shipped a carload of wheat amounting to 42,000 lb. (a) How many bushels did he ship? (b) What was the wheat worth at \$1.10 a bushel?

3. Find the cost of 300 lb. of potatoes at \$.75 a bushel.

4. How heavy is a load of 500 bu. of barley?

5. (a) Which weighs more: 500 bu. of barley or 400 bu. of rice? (b) How much more does it weigh?

6. Find the cost of:

(a) 4800 lb. of barley at \$.73 a bushel.

(b) 24,000 lb. of wheat at \$1.15 a bushel.

(c) 56,000 lb. of corn at \$.74 a bushel.

(d) 2820 lb. of potatoes at \$.95 a bushel.

(e) 88,000 lb. of oats at \$.49 a bushel.

7. How many bushels of wheat can be loaded on a freight car that has a capacity of 30 T.?

8. (a) Which weighs more: 1600 bu. of rice or 1200 bu. of alfalfa? (b) How much more does it weigh?

9. A barrel of flour weighs 196 lb. (a) How much does $\frac{1}{2}$ bbl. weigh? (b) $\frac{1}{4}$ bbl.? (c) $\frac{3}{4}$ bbl.?

10. Make up a problem using the information given in the table of weights at the beginning of this section.

¹ Adopted by most states because of the varying weights of grain.

125. Denominate Number Race

Can you score 100% on this test? Compete row against row. The score is the number right. The row having the highest average score wins.

Supply the missing numbers:

A

B

- | | |
|---|---|
| 1. 15 dimes = \$_____ | _____ hr. = 40 min. |
| 2. _____ yr. = 10 mo. | _____ half-pints = 2 qt. |
| 3. $3\frac{1}{2}$ gal. = _____ qt. | .25 mi. = _____ rd. |
| 4. _____ da. = 1 leap year | _____ mills = 1 dime |
| 5. 3.25 ft. = _____ in. | 48 hr. = _____ da. |
| 6. .75 T. = _____ lb. | \$1 = _____ nickels |
| 7. 1 cent = _____ mills | 5 cwt. = _____ lb. |
| 8. 2 yr. 3 mo. = _____ yr. | _____ hr. = 15 min. |
| 9. _____ rd. = .5 mi. | 320 rd. = _____ mi. |
| 10. _____ min. = 20 sec. | _____ qt. = .5 gal. |
| 11. 5 mi. = _____ yd. | $1\frac{1}{2}$ gross = _____ doz. |
| 12. _____ sq. in. = 3 sq. ft. | _____ yr. = 1 yr. 6 mo. |
| 13. _____ mo. = $1\frac{2}{3}$ yr. | $\frac{1}{2}$ A. = _____ sq. rd. |
| 14. 9 sq. yd. = _____ sq. ft. | $3\frac{1}{4}$ doz. = _____ articles |
| 15. .25 mi. = _____ ft. | _____ % of 1 gal. = 1 qt. |
| 16. $\frac{3}{4}$ sq. yd. = _____ sq. ft. | .5 $\times$ 12 in. = _____ in. |
| 17. $\frac{1}{4}$ gross = _____ | _____ min. = 10 sec. |
| 18. 9 mo. = _____ yr. | 8 yd. 18 in. = _____ yd. |
| 19. _____ ft. = 6 ft. 8 in. | 25 nickels = _____ cents |
| 20. 9 ft. 3 in. = _____ ft. | $\frac{3}{4}$ sq. yd. = _____ sq. ft. |
| 21. 8 gal. = _____ pt. | _____ lb. = 8 cwt. |
| 22. _____ nickels = \$.75 | $.37\frac{1}{2} \times 1$ mi. = _____ ft. |
| 23. 1 sq. mi. = _____ A. | _____ ton = 5500 lb. |
| 24. 1 hr. 15 min. = _____ min. | 3 score and 10 = _____ |
| 25. .75 $\times$ 1 ft. = _____ in. | 8 lb. 10 oz. = _____ oz. |

126. Recording Your Progress in Arithmetic

You are to keep a record of your progress in arithmetic this term on a line graph.

On the next few pages in this book you will find tests which are marked Test I, II, III, IV, V, VI, VII, VIII, IX, X. There are 16 examples in each test. Try a new test every few weeks.

Each time a test is given, record on the graph the number you have right. On a larger graph your teacher will show the record of the class. Then you can compare your record with the class record.

At the end of the term your record should be higher than at the beginning of the term.

Things to Remember

If you wish to improve your score,

1. Read your examples carefully.
2. Think before you write.
3. Check your work.
4. Correct all mistakes and do some extra work on similar examples.

127. Tests

You should complete each of these tests in about 30 minutes. Work quickly but carefully. Accuracy is more important than speed. Check your answers.

Test I

1. $7 \overline{)49063}$
2. $.4 + .3 + .2 =$
3. $7\frac{1}{4} - 6\frac{2}{3} =$
4. $30 \overline{)1710}$
5. What is the quotient when 4 is divided by $\frac{16}{21}$?
6. $\frac{3}{4} \times 9 =$
7. Find the product of 86.24 and 9.
8. $\begin{array}{r} 647 \\ 829 \\ 368 \\ 497 \\ 678 \\ \hline 456 \end{array}$
9. From 375 thousandths take 269 thousandths.
10. 25 is ? per cent of 125
11. $12\frac{1}{2}\%$ of ? = 28
12. 6% of 2645 =
13. Reduce to lowest terms: $\frac{75}{125}$
14. 7.5 mi. = ? feet
15. Find the perimeter of a rectangular plot that measures 3.5 rd. by 4.5 rd.
16. Four-fifteenths plus three-fifteenths plus two-fifteenths =

Test II

1. $? = 4\%$ of \$25,500
2. Subtract:

$$\begin{array}{r} 5\frac{5}{6} \\ 2\frac{2}{5} \\ \hline \end{array}$$
3. Three-fourths of twenty thousand =
4. $\frac{5}{6} \div \frac{5}{18} =$
5. $73 \overline{)5088.5}$
6. $56,740 \div 28 =$
7. 200 is $? \%$ of 400
8. Change $26\frac{2}{3}$ to an improper fraction.
9. $.3 + .5 + .8 =$
10. From 1.9 take 1.275.
11. Find the product of .62 and 4935.
12. Find the interest on \$2600 at 5% for 1 year.
13. $\frac{3}{4} + \frac{1}{2} + \frac{1}{12} =$
14. 75% of $? = 630$
15. What is the area of a plot that measures $16\frac{1}{2}$ rd. by $8\frac{1}{4}$ rd.?
16.
$$\begin{array}{r} 7,846 \\ 629 \\ 3 \\ 964 \\ 47,829 \\ 68,695 \\ \hline 5,478 \end{array}$$

Test III

1.
$$\begin{array}{r} 94,864 \\ 7,293 \\ 66,280 \\ 9,496 \\ 75 \\ 8 \\ \hline 8,245 \end{array}$$
2. $.15 + .26 + .17 =$
3. Multiply 8695 by 7.8.
4. $1000 \times 6.2467 =$
5. Five-sixths plus one-third =
6. $2\frac{1}{6}$ minus $\frac{2}{3} =$
7. What is the quotient when $\frac{1}{2}$ is divided by $\frac{1}{2}$?
8. Interest rate, 4%; time, 1 year; principal, \$1275. What is the interest?
9. How many square feet are there in 4.5 sq. yd.?
10. Reduce to a mixed number: $\frac{42}{24}$
11. $12 \times 2\frac{5}{8} =$
12. Divisor 274
Dividend 39,865
Quotient ?
13. 50 is ? per cent of 250
14. $87\frac{1}{2}\%$ of ? = 2163
15. Find $37\frac{1}{2}\%$ of \$12.40.
16. How much fence wire is needed to inclose a field 12.5 yd. square?

Test IV

1. Find the difference between 5 and .475.
2. Multiply twenty-five hundredths by eighty-four.
3. $200 \overline{)64.26}$
4. Dividend 456.1
Divisor 3.5
Quotient ?
5. What is 60% of \$5640?
6. $.6 - .005 =$
7. $.38 + .26 + .14 + .13 =$
8. What part of a square foot is 72 sq. in.?
9. $\frac{5}{1\frac{1}{2}}$
 $\frac{1}{3}$
 $\frac{5}{8}$

10. $12\frac{1}{10}$
 $- 9\frac{1}{2}$

11. Three-eighths times four-ninths = .
12. $7\frac{1}{5} \div 9 =$
13. 8 is ? % of 100
14. \$5 is 5% of ?
15. $\begin{array}{r} 8624 \\ 9378 \\ 4695 \\ 8769 \\ 5684 \\ \hline 3698 \end{array}$
16. Find the area of the right triangle that has a base of 32 ft. and a height of 24 ft.

Test V

- | | |
|---|---|
| 1. Principal \$1650
Rate 6%
Time 1 yr.
Interest ? | 9. $8\frac{3}{8}$
$26\frac{4}{8}$
$30\frac{3}{8}$
<u>7</u> |
| 2. Find the area of a square each side of which measures 26.25 yd. | 10. $86,457$
$29,836$
64
928
$6,945$
<u>7</u> |
| 3. Find the difference between 57.08 and 15.018. | |
| 4. Multiply:
59.35
<u>.86</u> | 11. How many square yards are there in 24 rd.? |
| 5. $.02 + .04 + .03 =$ | 12. $83.78 \times 4000 =$ |
| 6. $1\frac{1}{9} \times 3\frac{3}{5} =$ | 13. $75 \overline{)18.362}$ |
| 7. One-fourth minus two-eighths = | 14. What is $8\frac{1}{2}\%$ of 3640? |
| 8. Find the quotient when $2\frac{3}{4}$ is divided by $\frac{1}{16}$. | 15. 560 is ? per cent of 640 |
| | 16. Find the number of which \$1200 is $66\frac{2}{3}\%$. |

Test VI

1. $6000 \times 2.64 =$

2. $25 \overline{)244.5}$

3. What is 200% of \$1600?

4. $19.3 - 16.25 =$

5. Find the product:

63.68

$\underline{.006}$

6. Divide one by two-thirds.

7. $9\frac{1}{2} + 6\frac{1}{3} + 4\frac{4}{9} + 6\frac{4}{6} =$

8. What is the difference between $7\frac{1}{10}$ and $\frac{3}{5}$?

9. Principal \$2480

Rate 4%

Time 2 yr.

Interest ?

10. Subtract:

7 hr. 5 min.

 $\underline{6 \text{ hr. } 15 \text{ min.}}$

11. $\frac{6}{7} \times 2\frac{1}{5} =$

12. Multiply:

6462

$\underline{48\frac{3}{4}}$

13. Find 125% of \$18,000.

14. 12% of ? = 2400

15. 64,568

$29,364$

$8,269$

548

$9,678$

$\underline{49,006}$

16. Find the distance around a rectangular plot that measures 8 ft. 6 in. by 6 ft. 4 in.

Test VII

1. 13

$16\frac{2}{5}$

$17\frac{1}{2}$

$\underline{28\frac{7}{10}}$

2. $8\frac{1}{3} \times \frac{6}{7} =$

3. $20 \div 12\frac{1}{2} =$

4. $6\frac{1}{2} - \frac{2}{3} =$

5. Multiply:

63.08

$\underline{.025}$

6. Subtract:

182.5

$\underline{6.275}$

7. 8 gal. 3 qt.

4 gal. 2 qt.

$\underline{6 \text{ gal. } 1 \text{ qt.}}$

8. $167.2 + 8.245 + 16.45$
 $+ 128 + 6.04 =$

9. Multiply:

1645 $\frac{7}{8}$

$\underline{426}$

10. $\$64 \div 75 =$

11. Find 115% of 3640.

12. 1200 is ? per cent of
1200

13. What is the interest on
\$1500 for 6 months at
6%?

14. 15% of ? = 450

15. $6.3 \div 9000 =$

16. Find the area of a tri-
angle whose altitude is
 $18\frac{3}{4}$ ft. and whose base
is $20\frac{1}{2}$ ft.

Test VIII

1. Find the product of 4562.4 and 2600.
2. Subtract:

$$\begin{array}{r} 16 \text{ ft. } 9 \text{ in.} \\ 7 \text{ ft. } 11 \text{ in.} \\ \hline \end{array}$$
3. Time 9 months
Rate 3%
Principal \$12,000
Interest ?
4.
$$\begin{array}{r} 16 \\ 28\frac{5}{8} \\ 7\frac{1}{4} \\ 29\frac{3}{16} \\ \hline \end{array}$$
5. From $29\frac{1}{2}$ take $13\frac{3}{4}$.
6. $4\frac{1}{2} \times 2\frac{2}{3} =$
7. $9.287 \div .38 =$
8. Multiply:

$$\begin{array}{r} 4600 \\ 264\frac{1}{2} \\ \hline \end{array}$$
9. \$800 is ? per cent of \$400
10. $600 = 200\%$ of what number?
11. $\frac{7}{9} \div 3\frac{1}{2} =$
12. Find the difference between 20 and 3.75.
13. $.0125 \times .54 =$
14. $463.5 + 4 + 82.875 + 600 + 60.06 =$
15. $63 \div 2700 =$
16. Find the area of a triangle whose altitude is 12.2 yd. and whose base is 36.6 yd.

Test IX

1. Find the interest on \$2600 for 1 year 8 months at 4%.
2. Add:
 8 lb. 6 oz.
 4 lb. 3 oz.
 9 lb. 8 oz.
3. $8.2 \overline{)8340}$
4. Find .5% of \$1600.
5. 600 is ? per cent of 400
6. 125% of ? = 400
7. $4.62 \div 4200 =$
8. $38\frac{1}{2} + \frac{2}{7} + 26 + 25\frac{1}{4} =$
9. Minuend $204\frac{1}{8}$
 Subtrahend $100\frac{7}{8}$
 Remainder ?
10. $4 \times \frac{5}{8} \times 6\frac{1}{2} =$
11. $\frac{5}{12} \div 3\frac{1}{3} =$
12. $\begin{array}{r} 86,423 \\ 49,587 \\ 69,286 \\ 78,237 \\ 45,968 \\ \hline 26,984 \end{array}$
13. From .375 take .25.
14. $\frac{5}{7} \times 6.58 =$
15. $19.85 + 6.425 + 8.2 + 93 =$
16. Find the area of a triangle whose base is 6.75 yd. and whose height is 4.25 yd.

Test X

1. $.834 \div 6000 =$
2. Find $\frac{1}{4}\%$ of \$1800.
3. 1000 is ? per cent of 800
4. Subtract .75 from 1.875.
5. Find the product of 62.46 and 32.45.
6. $.26 + 1.246 + 375 + .4268 =$
7.
$$\begin{array}{r} 206\frac{1}{6} \\ 99\frac{3}{4} \\ 18\frac{7}{12} \\ \underline{6\frac{5}{9}} \end{array}$$
8. $84\frac{1}{3}$ minus $\frac{5}{6} =$
9. $8\frac{1}{2} \times 6\frac{2}{3} \times 3\frac{1}{4} =$
10. Rate 5%
Principal \$13,000
Time 2 yr. 6 mo.
Interest ?
11. Subtract:
$$\begin{array}{r} 27 \text{ yd. } 1 \text{ ft.} \\ 18 \text{ yd. } 2 \text{ ft.} \\ \hline \end{array}$$
12. $3\frac{3}{4} \div 1\frac{8}{12} =$
13. Divide 45.8 by .648.
14. 75% of ? = 2700
15.
$$\begin{array}{r} 86,954 \\ 23,706 \\ 85,499 \\ 20,060 \\ 67,868 \\ \underline{49,365} \end{array}$$
16. Find the area of a rectangular plot that measures 14.8 ft. by 7.25 ft.

SEVENTH GRADE — PART III

128. Problems

Without pencil.

1. What will 10 qt. of milk cost at \$.16 a quart?
2. At \$12.50 per ton, what must be paid (a) for 2 T. of coal? (b) For 6 T.? (c) For 10 T.?
3. How much change should you receive from a two-dollar bill if your purchases amount to \$1.65?
4. Grapefruit are sold at the rate of 2 for 25¢. Six grapefruit, at this rate, will cost ____.
5. Four dozen eggs at \$.55 per dozen will cost ____.
6. You give the clerk 3 one-dollar bills in payment for the eggs. He gives you \$.80 in change. Is that correct?
7. At \$.80 per pound, how much candy can be bought (a) for \$.40? (b) For \$.60? (c) For \$.20? (d) For \$2.50?
8. Bananas are sold at 45¢ per dozen or 4¢ each. How much is saved by purchasing by the dozen?
9. Corn sells at 22¢ per can or \$1.25 per half-dozen cans. I save ____ in purchasing by the half-dozen.
10. At \$.22 each, how many boxes of berries can be bought (a) for \$ $\frac{3}{4}$? (b) For \$1 $\frac{1}{2}$?
11. Find the cost of 2 $\frac{1}{2}$ lb. of butter at 52¢ per pound.
12. Lemons which cost the dealer 40¢ per dozen are sold at the rate of 6 for 25¢. (a) How much money does the dealer gain on a dozen? (b) What is the per cent of profit?
13. Find the cost of 7 lb. of sugar at the rate of 3 $\frac{1}{2}$ lb. for 27¢ and $\frac{1}{2}$ lb. of coffee at 48¢ per pound.
14. What will 4 handkerchiefs cost (a) at 15¢ each? (b) At \$1.20 per dozen?

15. What must I pay for 3 cakes of soap (a) at 8¢ each? (b) At 80¢ per dozen? (c) At 6 for 50¢?

16. Mary is baking a cake. Her recipe calls for $\frac{3}{4}$ of a cup of milk. (a) How much milk should she use if she bakes a cake half the size of the one the recipe will make? (b) If she doubles the original recipe, Mary will need _____ cups of milk.

17. If meat loses 25% of its weight in cooking, what will a 24-pound roast weigh after cooking?

With pencil.

18. The sales for one week in the Neighborhood Department Store were as follows: millinery, \$475.83; boys' clothing, \$495.60; shoes, \$395.72; men's furnishings, \$327.55; dry goods, \$1757.29; notions, \$187.79. Find the total amount of sales for the week.

19. Mrs. White made the following purchases at the store on Tuesday: shoes, \$7.50; umbrella, \$3 $\frac{1}{2}$; gloves, \$1 $\frac{3}{4}$; hat, \$7.65. How much did she spend in all?

20. State the amount of change a customer should receive from a \$50 bill given in payment for the following purchases:

3 pr. gloves at \$1.85

3 yd. silk at \$2.65

2 pr. shoes at \$7.75

24 $\frac{1}{2}$ yd. muslin at \$.38

21. Mrs. Brown spent \$24 $\frac{3}{4}$ for silk at \$2 $\frac{3}{4}$ per yard. She bought _____ yards.

22. There were three extra clerks on duty at the dress-goods counter during the sale. On one day, the first clerk's sales totaled \$121.75; those of the second clerk, \$97.55; those of the third clerk, \$110.03. The total amount of sales for the day by the three clerks was _____.

23. In four consecutive weeks Mary Black, a clerk in the store, earned the following amounts: \$22.70, \$27.50, \$30.50, and \$25.75. What were her average weekly earnings?

24. Mr. Jones made the following bank deposits last week: \$1755.83; \$1692.02; \$1972.50; \$1263.45; \$1205.03; \$1922.06. In all, he deposited ____.

25. Joe Blake made the following deposits to his bank account in the last three months: $\$10\frac{3}{4}$, $\$13\frac{1}{2}$, and $\$20\frac{2}{5}$. How much more must he deposit to make \$75?

26. Mr. Curry owns two adjoining farms. One farm contains 73.25 A.; the other contains 87.5 A. He sold 27.7 A. of the second farm to Mr. Bond. (a) How many acres did Mr. Bond buy? (b) How many acres remain in the second farm? (c) How many acres does Mr. Blake still own?

27. A train traveling at the rate of 37.9 mi. per hour covers ____ miles in 8 hr.

28. $42.00 \div 35 = ?$

$26.25 \div 35 = ?$

$437.25 \div 35 = ?$

$12.25 \div 35 = ?$

$2625.00 \div 35 = ?$

$\frac{\quad}{?} \div 35 = ?$

29. It takes 2.5 yd. of ribbon to make a rosette. (a) How many yards must Mary buy to make a dozen rosettes? (b) How many rosettes can Mary make from a bolt of ribbon containing 10 yd.? (c) What will be the cost of each rosette if the ribbon costs \$.38 per yard?

30. A farm consisted of $40\frac{1}{2}$ A. of woodland and $54\frac{1}{2}$ A. of meadow land. The owner bought $63\frac{3}{4}$ A. additional. What was the total acreage of the farm then?

31. How much money is spent in equipping a kitchen as follows:

FURNITURE

1 Gas Stove at \$75.00, discount 10%
 1 Small Table at \$7.75, discount 5%
 1 Cabinet at \$29.50, discount 5%
 2 Chairs at \$2.75 each, discount 5%

WOODENWARE

1 Towel Rack at \$.75
 1 Rolling Pin at \$.48
 2 Brooms at \$.85 each
 3 Brushes at \$.79 each

EARTHENWARE

1 Nest of Bowls at \$1.78
 2 Pitchers at \$.57 each

TINWARE

1 Flour Sifter at \$.40
 1 Bread Box at \$1.25
 1 Cake Box at \$.95

32. Find the total cost of the furnishings listed below.
 A 10% discount is allowed on the furniture and rugs.
 A 15% discount is allowed on the electric washer.

LIVING ROOM

Rug \$75.00
 Table \$62.50
 Bookcase \$37.75
 Desk \$37.50
 2 Chairs at \$ 9.50 each

DINING ROOM

China Cabinet \$75.85
 Table \$87.50
 4 Chairs at \$ 7.95 each
 Rug \$58.50
 Tea Wagon \$21.60

BEDROOM

Bed and Spring \$50.75
 Dresser \$47.50
 Chair \$ 9.75
 Table \$ 7.85
 Rug \$14.75

LAUNDRY

Electric Washer \$195.00

KITCHEN

Stove \$75.75
 Cabinet \$38.90
 Table \$ 8.75
 2 Chairs at \$ 3.85 each

129. Practicing Thrift

We have learned that thrift, or the wise management of money, leads to prosperity. Thrift, as a habit, leads to success in life.

There are several ways of saving money. Perhaps the best way is to set aside a definite sum each week or month, and to deposit this sum regularly in a savings bank where it will earn interest. It is a good plan, too, to have a purpose in view when we save. A boy, for example, may save toward his college expenses; a girl may save in order that she may help to pay for a course in music. In these days, many banks have special Christmas Club accounts. By means of a Christmas Club account it is possible to save either a large or a small amount, depending on the size of the weekly deposit. In some banks one may join a Vacation Club.

One may save money by taking advantage of the sales offered from time to time by the various stores. At such sales one may often buy needed articles at greatly reduced prices.

Again, one may often save money by the prompt payment of certain bills whenever a sum is deducted from the amount of the bill if paid within a certain time. Good business men always take advantage of this means of saving money.

But true thrift does not consist merely in the wise use of money. One may be thrifty in other respects. Careful use of our time, proper care of our clothing and other personal belongings, and proper treatment of our school-books and other public property are all true forms of thrift.

130. Discount Sales

Early in January, Mr. Gray advertised a sale of furniture at a reduction of 20% below the regular cost. Mrs. Ames bought a sofa which had been marked \$75.60. How much did she save by buying at the reduced price?

$$20\% = \frac{1}{5}$$

$$\frac{1}{5} \times \frac{\$15.12}{\cancel{\$75.60}} = \$15.12 \text{ saved}$$

In business the regular price of an article is called the *list price*. What was the list price of the sofa bought by Mrs. Ames? When an article is sold at less than the list price, it is sold at a *discount*. The discount, in such cases, is the amount deducted from the regular or list price. When the discount is expressed as a certain per cent, we speak of it as the *rate of discount*. What is the rate of discount in the example above? What is the discount?

Discount, you will note, is another of the business applications of percentage.

Finding the discount is the same as finding a ____ of a number.

1. Tell at sight the amount of discount on each of the following if the rate of discount is 20% off list prices:

<i>Article</i>	<i>List Price</i>	<i>Article</i>	<i>List Price</i>
(a) Vanity Lamps	\$3.50	(d) French Pottery	
(b) Bridge Lamps	\$4.00	Lamps	\$15.00
(c) Italian Pottery		(e) Bronze Reading	
Lamps	\$7.50	Lamps	\$10.50
(f) Metal Table Lamps	\$25.00		

2. Find the amount saved on each article by purchasing it at the sale:

<i>Article</i>	<i>List Price</i>	<i>Rate of Discount</i>
(a) Sewing Tables	\$18.00	20%
(b) Chairs	\$15.00	20%
(c) Mirrors	\$27.50	15%
(d) Buffets	\$49.50	10%
(e) Dining Tables	\$75.75	20%
(f) Beds	\$36.00	25%

131. Finding the Net Cost

At a special sale of overcoats, Mr. James bought a coat regularly marked \$65 at 20% off. (a) What was the discount? (b) How much did Mr. James pay for the coat?

$$\begin{aligned}
 20\% &= \frac{1}{5} \\
 \frac{1}{5} \times \$65 &= \$13, \text{ discount} \\
 \$65 - \$13 &= \$52, \text{ sum paid for the coat} \\
 \$52 &= \text{net cost of the coat}
 \end{aligned}$$

The *net cost* of an article is the regular cost minus the discount.

Explain how the net cost was found in the example above.

1. A radio set listed at \$250 was sold at a 30% discount. For what price was it sold?

2. At $2\frac{1}{2}\%$ discount for cash, find the sum paid to Mr. Grant in settlement of each of the following bills:

- | | |
|---------------|--------------|
| (a) \$175.50 | (d) \$148.00 |
| (b) \$300.00 | (e) \$275.00 |
| (c) \$1200.00 | (f) \$328.00 |

3. Complete the following:

<i>Article</i>	<i>List Price</i>	<i>Rate of Discount</i>	<i>Discount</i>	<i>Net Cost</i>
(a) Grass Shears	\$2.00	15%		
(b) Garden Shears	\$3.50	20%		
(c) Spade	\$1.75	20%		
(d) Hoe	\$2.25	20%		
(e) Rake	\$1.50	30%		
(f) Lawn Mower	\$35.00	30%		
(g) Lawn Mower Jr.	\$27.50	20%		
(h) Lawn Sprinkler	\$7.50	30%		

4. Many publishers allow a discount of 20% to students. What must a student pay for a book listed (a) at \$3.75? (b) At \$1.80? (c) At \$1.25? (d) At \$2.50?

5. What is the net amount of a bill of goods the list price of which is \$90.60 with 5% off for cash?

6. What were the cash prices paid for the following at a sale of used cars at which a discount of 20% was given on all cars: (a) Ford, \$420; (b) Dodge, \$640; (c) Buick, \$825; (d) Cadillac, \$975; (e) Studebaker, \$850?

*7. A dealer sells \$1500 worth of goods at 5% discount if the bill is paid within 60 days, or 10% discount if the bill is paid at once. What amount would be saved by prompt payment?

8. A bargain sale of dress goods is advertised, at which a $33\frac{1}{3}\%$ discount is offered. (a) What would be saved by purchasing at bargain prices 12 yd. of velvet, listed at \$2.70 per yard, and 10 yd. of silk, listed at \$1.80 per yard? (b) What would be the net cost per yard of the velvet? (c) Of the silk?

9. What will be saved by purchasing the following articles at a bargain sale which advertises a reduction of 25%: 6 books listed at \$1.60 each, and 3 fountain pens listed at \$2.88 each?

10. Goods amounting to \$675 were purchased on June 1. Terms: 3 months, or 10% off for cash. What can be saved by paying the bill on June 1?

*11. One store lists a book for \$3.50 cash. Another store lists the same book for \$4.25 with a discount of 25%. Which is the lower price, and how much lower is it?

12. Find the net cost of 2 doz. pens, listed at \$2.50 each, if a discount of $16\frac{2}{3}\%$ is allowed.

132. Trade or Commercial Discount — Successive Discounts

You have learned that goods are often sold for less than the marked or list price. Goods sold in this way are said to be sold at a _____. Discounts are allowed for several reasons: (1) for the prompt payment of bills; (2) on quantity purchases; (3) at special discount sales, when the dealer wishes to make a quick “turnover” of his stock.

In many lines of business, merchants sell both at wholesale and at retail. In their catalogues, goods are advertised at certain prices. Dealers are allowed a *trade discount* on these prices.

Mr. Brown deals in furniture. He buys stock listed at \$7500 from the Crown Manufacturing Company and is allowed a trade discount of 30%, with an additional 5% off for cash. He pays his bill at once. What does the furniture cost him?

What rate of discount was Mr. Brown allowed on his bill? What did this discount amount to? What was the net cost of the furniture minus the trade discount?

Dealers are often allowed *two* or even *three* successive discounts on the same purchase. In addition to the 30% trade discount, Mr. Brown was allowed a 5% discount for cash. What did the cash discount amount to? What was the net cost of the furniture?

\$7500 list price	\$7500	\$5250	\$5250
.30	\$2250	.05	\$262.50
<u>\$2250.00</u>	<u>\$5250</u>	<u>\$262.50</u>	<u>\$4987.50</u>
trade discount	list price minus trade discount	cash discount	net cost

In computing discount when *two* discounts are allowed, the *second discount* is always computed on the sum left after the *first discount* has been deducted from the list price. The sum left after *both* discounts have been deducted is the ____ of the bill. The *net price*, then, is what is actually paid for an article after all discounts have been deducted.

1. Find the net price of the following:

- (a) 6 chairs at \$9.50 each, with discounts of 20% and 5%.
- (b) 2 tables at \$75.00 each, with discounts of 25% and 5%.

2. Mr. Allen buys \$1500 worth of dry goods and receives discounts of 15% and 10%. What is the net cost of the goods?

3. The discounts on a piece of machinery listed at \$2560 are 25% and 10%. What is the net price?

4. If the order of the discounts was reversed in Problem 3, what would the net cost be?

5. Which is better for a purchaser: a single discount of 25% or successive discounts of 15% and 10% on a bill of \$720?

6. A piano listed at \$900 was sold with discounts of 15% and 10%. Find the net cost.

7. Find the net cost of goods listed and discounted as follows:

- | | | | |
|-----------|--------------|-----------|-------------|
| (a) \$300 | 30% and 20% | (d) \$750 | 15% and 10% |
| (b) \$200 | 25% and 5% | (e) \$750 | 10% and 15% |
| (c) \$420 | 25% and 12½% | (f) \$900 | 20% and 10% |

8. An automobile tire is listed at \$25. One dealer offers discounts of 10% and 10%. A second dealer offers a single discount of 20%. Which is the lower price?

9. Find the net cost of each of the following:

- (a) 12 tires at \$12.50 each, discounts 15% and 5%.
 (b) 18 yd. of velvet at \$4.50, and 12 yd. of satin at \$2.25, discounts 20% and 20%.

10. A check for _____ will settle a bill of goods amounting to \$825, with discounts of 10% and 5%.

11. A grocer received a bill for 60 bbl. flour at \$6.25 per barrel. He is allowed a trade discount of 15% with 5% for cash. What does the flour cost him if he pays for it promptly?

*12. Mr. Francis receives a bill for \$528 marked: "Terms: 2/10; n/30." The trade discount allowed is 12½%. What is the net cost to Mr. Francis if the bill is

paid at once? (NOTE: 2/10 means "2% if paid within 10 days." n/30 means that the bill must be paid *within* 30 days. Will the cash discount be allowed if the bill runs 30 days? How do you know?)

Complete these statements:

1. The regular price of an article is called the ____ price.
2. When an article is sold at less than the list price, it is said to be sold at a ____.
3. The amount deducted from the regular or list price is called the ____.
4. The net price of an article is its cost after the ____ has been deducted from the ____.
5. How do you find the net cost of an article on which a discount has been allowed?

133. Interest — Review

Complete the following sentences:

1. Money paid for the use of money is called ____.
2. The sum of money on which interest is paid is called the ____.
3. The per cent of the principal paid each year as interest is called the ____.
4. The period for which interest is paid is called the ____.
5. The sum of the principal and interest is called the ____.
6. The interest which a borrower has to pay depends upon the ____, the ____ of interest, and the ____ for which the money is borrowed.

Interest is one of the business applications of percentage.

What is the interest on \$400 at 6% for 1 year 6 months?

$$\overset{4}{\cancel{400}} \times \overset{3}{\cancel{6}} \times \frac{3}{2} = \$36 \text{ interest}$$

To find the interest, multiply the principal by the rate expressed as a fraction and by the time expressed as a fraction of a year.

Following this rule, find the interest on each of the following:

Principal	Rate	Time	Principal	Rate	Time
1. \$200	6%	1 yr. 6 mo.	8. \$750	4%	$\frac{1}{2}$ year
2. \$400	4%	$2\frac{1}{3}$ years	9. \$250	5%	3 yr. 8 mo.
3. \$600	6%	$1\frac{1}{4}$ years	10. \$1200	6%	9 months
4. \$700	6%	1 year	11. \$2000	4%	6 months
5. \$900	6%	1 year	12. \$1500	6%	9 months
6. \$450	6%	2 years	13. \$3000	6%	1 yr. 6 mo.
7. \$750	5%	3 years	14. \$5500	6%	2 yr. 3 mo.

134. Interest for 30, 60, 90 Days — the 6% Method

In order to buy new stock for the holiday trade, Mr. Elliott needed \$5000 in cash. He borrowed the money for 60 days at 6% interest. How much interest did he have to pay?

Money is often borrowed for short periods of time — for example, for 30, 60, or 90 days. In computing interest

for such periods, it is customary to reckon 360 days to the year. Then each day's interest equals $\frac{1}{360}$ of a year's interest.

At 6%, the interest on any sum for 1 year equals .06 of the principal. At 6%, the interest for 60 days, or $\frac{1}{6}$ of a year, equals .01 of the principal. (Interest for 60 days = $\frac{1}{6}$ of 6% = 1% = .01)

Therefore, to find the interest on any sum for 60 days at 6%, we find .01 of the principal.

In Mr. Elliott's case: interest on \$5000 for 60 days = .01 of \$5000, or \$50.

To find the interest on any sum for 60 days at 6%, move the decimal point in the principal two places to the left.

1. What is the interest on each of the following sums for 60 days at 6%?

- | | | | | |
|------------|------------|------------|-----------|------------|
| (a) \$750 | (c) \$705 | (e) \$4000 | (g) \$85 | (i) \$965 |
| (b) \$9570 | (d) \$1875 | (f) \$352 | (h) \$175 | (j) \$1450 |

If you knew the interest on a certain sum of money for 60 days at 6%, how would you find the interest for 30 days?

What is the interest on \$300 for 30 days at 6%?

Interest on \$300 for 60 days = \$3.00

Interest on \$300 for 30 days = $\frac{1}{2}$ of \$3.00 = \$1.50

2. Tell at sight the interest on each of the following sums for 30 days at 6%:

- (a) \$1000 (c) \$700 (e) \$250 (g) \$760 (i) \$570
 (b) \$1200 (d) \$900 (f) \$2400 (h) \$3000 (j) \$220

3. Complete the following:

(a) To find the interest for 60 days at 6%, take ____% of the principal.

(b) To find the interest for 30 days at 6%, take ____ of the interest for 60 days.

Suppose that Mr. Elliott had borrowed the \$5000 for 90 days. How much interest would he have had to pay at the end of the 90 days?

90 days = 60 days + ____

The interest on \$5000 for 60 days at 6% = \$50.00

The interest on \$5000 for 30 days at 6% = ____

The interest on \$5000 for 90 days at 6% = ____

For 90 days, Mr. Elliott would pay ____ interest on the \$5000 he borrowed.

4. Tell at sight the interest on each of the following sums for 90 days at 6%:

- (a) \$450 (c) \$800 (e) \$4200 (g) \$2700 (i) \$2100
 (b) \$380 (d) \$1500 (f) \$760 (h) \$1800 (j) \$3800

5. Find the interest on \$4000 at 6% (a) for 60 days; (b) for 30 days; (c) for 90 days.

6. Find the interest on \$360 at 6% (a) for 60 days; (b) for 30 days; (c) for 90 days.

7. What is the interest at 6% on \$470 (a) for 60 days? (b) For 30 days? (c) For 90 days?

8. What is the interest at 6% on \$7000 (a) for 60 days? (b) For 30 days? (c) For 90 days?

Let us suppose that Mr. Elliott was able to borrow the \$5000 he needed at 4% interest instead of at 6%. How would that fact affect the amount of interest to be paid?

$$4 = \frac{2}{3} \text{ of } 6$$

At 6%, the interest for 60 days on \$5000 = \$50

At 4%, the interest for 60 days on \$5000 = $\frac{2}{3} \times \$50$

$$\frac{2}{3} \times \$50 = \frac{100}{3} = \$33.33\frac{1}{3} \text{ interest at } 4\%$$

What is the interest on \$300 for 60 days at 4%?

Interest on \$300 for 60 days at 6% = \$3.00

$$\text{Interest on } 300 \text{ for } 60 \text{ days at } 4\% = \frac{2}{3} \times \overset{\$1.00}{\cancel{\$3.00}} = \$2.00$$

To find the interest on any amount at 4%, first find the interest at 6%. Then take $\frac{2}{3}$ of this amount for the interest at 4%.

Use pencil if needed.

Find the interest at 4% on each of the following sums for the time given:

1. \$200, 60 days

2. \$900, 60 days

3. \$1200, 30 days

4. \$1500, 90 days

5. \$750, 60 days

6. \$400, 60 days

7. \$700, 60 days

8. \$1400, 90 days

9. \$1800, 30 days

10. \$1250, 90 days

11. Complete the following statements:

(a) The interest on any sum for 60 days at 6% is _____ of the principal.

(b) When 360 days are reckoned as a year, the interest for 60 days at 6% is $\frac{1}{6}$ of the interest for a year.

(c) To find the interest on any sum for 30 days at 6%, take _____ of the interest for 60 days.

Without pencil.

12. Tell at sight the interest on each of the following sums for 60 days at 6%:

(a) \$1200	(d) \$1550	(g) \$4225	(j) \$165
(b) \$875	(e) \$1600	(h) \$427	(k) \$1650
(c) \$950	(f) \$1775	(i) \$9660	(l) \$65

13. Compute the interest on each of the following sums for 30 days at 6%:

(a) \$1260	(d) \$250	(g) \$387	(j) \$1475
(b) \$960	(e) \$4400	(h) \$3870	(k) \$478
(c) \$1220	(f) \$440	(i) \$75	(l) \$3779

14. What is the interest on each of the following sums for 90 days at 6%?

(a) \$328	(d) \$1250	(g) \$4500	(j) \$1468
(b) \$7425	(e) \$745	(h) \$4020	(k) \$468
(c) \$875	(f) \$8000	(i) \$380	(l) \$7550

15. Find the interest at 4% on each of the following sums, first for 60 days; then for 30 days; then for 90 days:

(a) \$1200	(d) \$4000	(g) \$8000	(j) \$2700
(b) \$750	(e) \$4500	(h) \$8020	(k) \$6850
(c) \$1500	(f) \$4250	(i) \$8575	(l) \$4780

135. General Problems in Interest

With pencil.

1. On March 1 a merchant borrowed \$3000 from a bank, arranging to repay the loan with interest at 6% on June 1. He paid the bank \$3045. Was that the correct amount? How much of this sum was interest?

2. A man borrowed \$12,000 to invest in a fruit farm. What is the yearly interest at the rate of 6%?

3. A town borrows \$150,000 at 5% for the purpose of improving its highways. Find the yearly interest on this loan.

*4. A man borrowed \$500 on November 1 and repaid the loan on May 1 of the following year with interest at 6%. He needed _____ to cancel the debt.

5. How much interest is due on a loan of \$1850 for 6 months at 4%?

*6. Estimate the interest on \$700 for $1\frac{1}{2}$ years at 6%. Then work the example and compare your answer with the estimated answer.

7. A man borrowed \$1500 for $2\frac{1}{2}$ years at 5% interest. (a) How much interest did he pay yearly? (b) How much interest did he pay in the $2\frac{1}{2}$ years?

*8. The interest on \$16,000 at 6% would pay the rent of a house at the rate of _____ a year or _____ a month.

9. Mr. Flood borrowed \$2700 for $2\frac{1}{2}$ years, paying interest at the rate of 6%. At the end of each year he paid the interest then due. (a) What was the amount he owed at the final settlement of the debt? (b) If he had paid no interest until the end of the $2\frac{1}{2}$ years, what amount of money would he have needed to settle the debt?

136. The Interest Formula

To find interest on any sum, multiply the principal by the rate expressed as a fraction and by the time expressed as years or a part of a year.

Interest = principal $\times$ rate $\times$ time, or $i = prt$

Mr. Green borrowed \$120 for $2\frac{1}{2}$ years at 4%. How much interest did he pay in all?

$$i = prt$$

$$i = \frac{\$1.20}{\cancel{\$120}} \times \frac{\cancel{4}}{100} \times \frac{5}{2} = \$12$$

Work the following examples in the same way. First give the value of p , r , and t in each. Then find the interest:

- | | |
|---|---|
| 1. \$500 for $2\frac{1}{2}$ years at 4% | 3. \$350 for $1\frac{1}{2}$ years at 6% |
| 2. \$200 for $1\frac{1}{4}$ years at 5% | 4. \$780 for $2\frac{1}{2}$ years at 4% |

The amount = principal plus interest. Then

$$a = p + i$$

I borrowed \$200 for 2 years at 4%. (a) What was the total interest? (b) What was the total amount repaid?

$i = prt$ $i = \frac{2}{\cancel{200}} \times \frac{4}{\cancel{100}} \times 2 = \16	$a = p + i$ $a = \$200 + \$16 = \$216$
--	--

5. Apply the formula $a = p + i$ to Examples 1-4.

137. Compound Interest

Ned worked during one summer vacation and earned \$200 which he put into a savings bank to save for his college education. The bank manager told him that if he allowed it to stay in the bank, they would pay him 4% compound interest, and that the interest would be compounded quarterly. This was not the same kind of interest as simple interest. Compound interest meant interest not only on the principal but also on the interest already due. It worked out in this way:

\$200 principal; 4% rate at compound interest, compounded quarterly

4% a year = 1% every 3 months, or each quarter year

\$200 Principal for first quarter

.01

\$2.00 Interest for quarter year

200 Principal for first quarter

\$202 Principal for second quarter

.01

\$2.02 Interest for second quarter

202 Principal for second quarter

\$204.02 Principal for third quarter

(Do not compute compound interest on sums less than \$1.)

.01

\$2.04 Interest for third quarter

204.02 Principal for third quarter

\$206.06 Principal for fourth quarter

.01

\$2.06 Interest for fourth quarter

206.06 Principal for fourth quarter

\$208.12 Ned's account at end of first year

Compound interest for 1 year = \$8.12

The simple interest on \$200 for 1 year at 4% would be \$8.00. You see that Ned would receive \$.12 more by

getting compound interest than he would at simple interest.

Note the following facts about compound interest:

1. Compound interest amounts to more than simple interest at the same rate.
2. Compound interest is interest not only on the principal but also on the interest already due.
3. The computation of compound interest is a series of interest problems with a changing principal each period.

Suppose the interest had been compounded semiannually instead of quarterly.

4% annually = 2% semiannually	
\$200	Principal for first six months
.02	
\$4.00	Interest for first six months
200	
\$204	Principal for second six months
.02	
\$4.08	
204	
\$208.08	Ned's account at the end of 1 year

Interest compounded semiannually will amount to less than interest at the same rate compounded quarterly.

Calculate the compound interest:

	Principal	Rate	Time	Compounded
1.	\$300	4%	2 years	Semiannually
2.	\$500	4%	1 year	Quarterly
3.	\$2000	6%	1 year 6 months	Semiannually
4.	\$250	4%	1 year	Quarterly
*5.	\$2500	4½%	1 year 6 months	Semiannually

138. Problems

1. A boy received a prize of \$50 which he deposited in a savings bank which pays 4% interest compounded semiannually. What did this amount to in 2 years?

2. What will \$1000 amount to in 1 year if interest at 4% is compounded quarterly?

3. Allen transfers \$20.50 from his school bank to the savings bank. How much will he have in a year if he receives 4% interest compounded quarterly?

4. Find the difference between simple interest at 4% and compound interest at the same rate compounded quarterly for 1 year on \$400.

5. On October 1, I deposited \$500 in the Essex Savings Bank, which pays 4% interest compounded quarterly. On July 1 of the next year I withdrew all my money. How much did I withdraw?

*6. Find the amount on \$250 for 1 year 6 months at $4\frac{1}{2}\%$ interest compounded semiannually.

*7. (a) What will \$425 amount to at compound interest at 4% in 4 years if the interest is compounded annually? (b) What will it amount to at simple interest at the same rate?

*8. Which will earn more money and how much more will it earn: \$3000 deposited in a bank for 1 year at 4%, compounded quarterly, or the same amount invested in a business yielding 5% annually?

*9. At the end of 2 years I shall need \$1350. If I deposit \$1200 now in a bank paying 4% interest, compounded semiannually, and leave it there for 2 years, (a) shall I have enough? (b) If not, how much more shall I need?

139. Banks

William was a pupil in Grade 7A of a public school. For several years he had been putting money in the school bank. One day his father told him that they were going to move, and that since he would have to change schools, he had better withdraw his money from the school bank and deposit it in a *savings bank*. William withdrew the money and went with his father to a savings bank and deposited his savings. He now has an account of \$20.50 in a savings bank in his own name. The savings bank takes care of his money and pays him 4% a year interest or 1% every three months.

At first William wondered how the bank could do this, for he thought, as many young people think, that the bank kept in its vaults the money he had deposited. His father explained that the savings bank lends the money which it receives to other persons to help them build houses or carry on business, and charges 5% or 6% interest on the loans. Because of the higher rate of interest which the bank receives from the persons to whom it lends money, it can pay William 4% interest on his deposit and still have money left over to pay the expenses of running the bank. William also learned that he cannot withdraw money from day to day without losing interest. The bank will not give him interest on money unless he leaves it there for at least three months or for the interest period.

Business banks or *commercial banks* receive deposits, lend money on notes, and invest money in many more ways than do savings banks. They must always keep a certain part of their total deposits on hand. Money de-

posited in a business bank may always be withdrawn by the depositor by check. William’s father had his account in a business bank and could therefore pay his bills by check. William asked if he might go with his father the next time he went to his bank. His father agreed, and later they went to the bank. William’s father wished to deposit \$150 in cash and a check for \$220. First he made out a slip that looked like this:

DEPOSITED TO THE ACCOUNT OF		
<i>William Anderson</i>		
IN		
THE SUFFOLK NATIONAL BANK		
ALL ITEMS ACCEPTED SUBJECT TO THE CONDITIONS STATED ON THE REVERSE SIDE OF THIS DEPOSIT SLIP.		
DATE <i>Jan. 4</i> 19 <i>30</i>		
	DOLLARS	CENTS
BILLS _____	<i>150</i>	
SPECIE _____		
CHECKS _____	<i>220</i>	

_____	<i>370</i>	

Then he took the slip, his pass or deposit book, and what he was depositing to a window marked "Receiving Teller." The teller examined the slip and the deposits and entered in the pass book the full amount, \$370. Mr. Anderson now had added \$370 to his account at the bank.

1. What difference do you note between a savings bank and a business bank?
2. Which is better for saving money?
3. Which is more convenient for paying bills?
4. What is a deposit slip?
5. Which kind of bank is most useful for boys and girls?
6. Make out a deposit slip in your name for \$100 in checks, \$35 in bills, and \$2.50 in silver.

140. Paying Bills by Check

William's father called him in at the end of the week to show him how he made out checks for his bills. His first bill was for \$70 owed to the Adirondack Lumber Company of Canton, New York. This is how the check looked:

No. 572

New York, Jan. 10, 1930

THE SUFFOLK NATIONAL BANK

Pay to the Order of Adirondack Lumber Company \$ 70⁰⁰/₁₀₀

Seventy DOLLARS

William Anderson

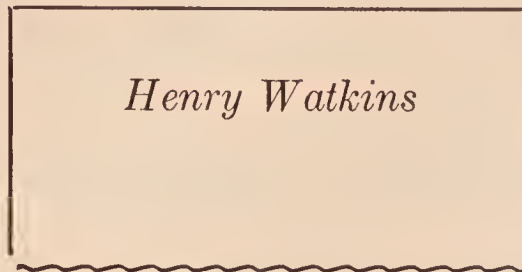
Then he filled out a small leaf left in his check book, called the *stub*, and explained to William that it is very important for any one who uses checks to fill out all the items accurately so that he may know how much his balance is and when he made out the check.

No. <u>572</u>	\$ <u>70.00</u>
<u>Jan. 10</u>	<u>19 30</u>
To <u>Adirondack Lumber Company</u>	
For <u>box material</u>	
Balance brought forward	3285 90
Amount deposited	
Total	3285 90
Amount this check	70
Balance carried forward	3215 90

The bank keeps its own record, and every month Mr. Anderson receives from the bank all the checks that have come back, as well as a statement of his account showing his deposits, his withdrawals, and the balance left in his account. Mr. Anderson said he kept the returned checks carefully because he could use them at any time as receipts. This statement interested William. He asked: "How can you prove that the right man received the check?" His father showed him a returned check on the back of which was the signature of the person to whom the check was made payable. "That signature on the back is called

No. 56	\$83 ⁷⁵ / ₁₀₀		No. 56	BOSTON, MASS.		Dec. 12,	1929
Dec. 12	1929		CITIZENS NATIONAL BANK 5-12				
To	John C. Grant						
For	Groceries		Pay to the Order of John C. Grant \$83 ⁷⁵ / ₁₀₀				
Balance brought forward	892 50		Eighty-three and 75/100 DOLLARS				
Amount deposited	100						
Total	992 50						
Amount this check	83 75		MEMBER FEDERAL RESERVE SYSTEM				
Balance carried forward	908 75		Thomas Gorman				

the indorsement," said his father, "and that proves to me that he received the money." The back of the check looked like this:



Henry Watkins

Before a check can be cashed or deposited in a bank, the person to whom it is payable must indorse it on the back. *An indorsement is absolutely necessary.* It should be written across the left end of the check.

One thing more troubled William. How did the bank know that his father signed those checks? Mr. Anderson explained that before he opened his account at the bank he had to sign his name twice as specimens of his signature. His signatures on checks were compared with those on record at the bank to make sure that they were his.

Read the check on page 208. To whom is it made payable? For what amount? Who wrote the check? On what bank is it drawn? On what date? Why is the check numbered? Why is the amount written in two ways? What must Mr. Grant do before he cashes or deposits the check?

How does the bank know that Mr. Gorman made out this check? What does Mr. Gorman do with the check when it is returned to him?

What use is made of the stub? Why does the stub state for what purpose the check was made?

Write a check in payment of a bill from a gas company.

141. Keeping an Account at the Bank

Mr. Gordon had an account at the Greenwich Bank. At the beginning of the week his balance amounted to \$2406.50. During the week his deposits and withdrawals were as follows:

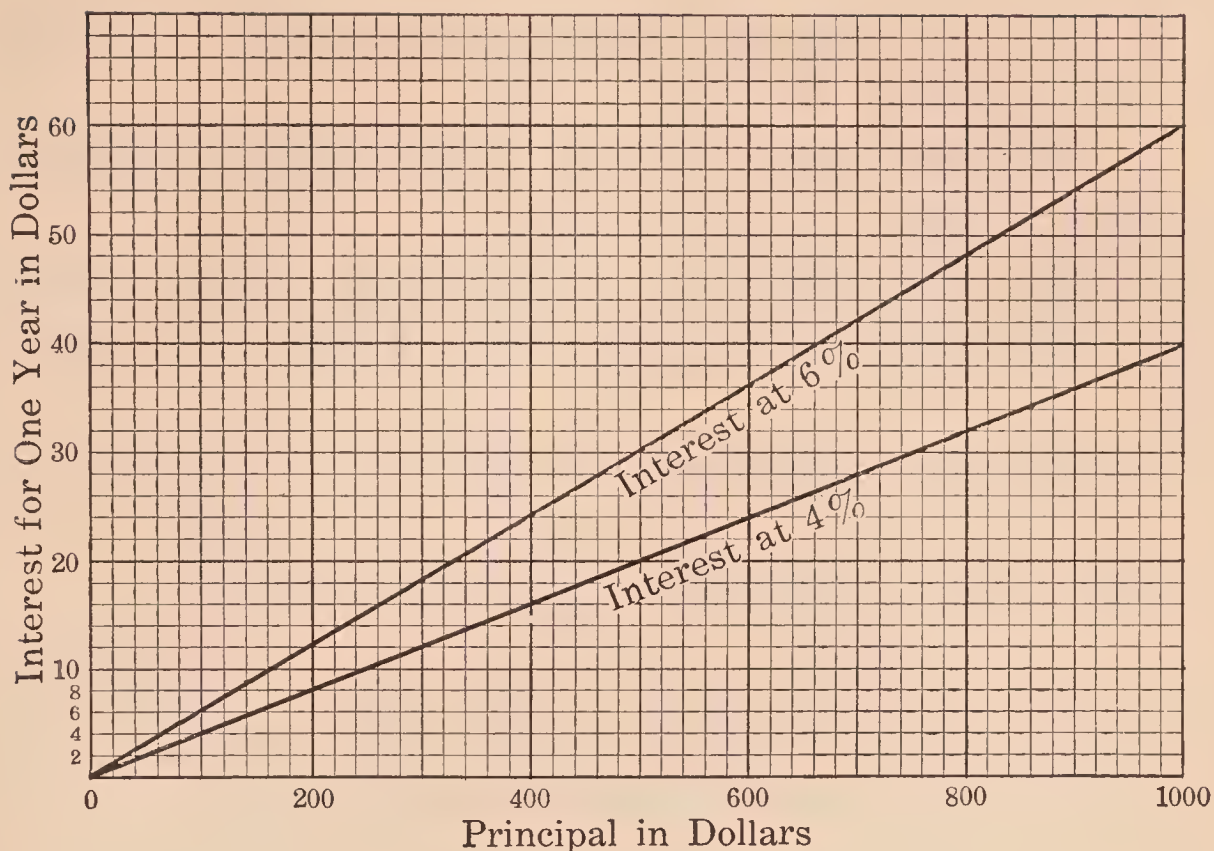
	<i>Deposits</i>	<i>Withdrawals</i>
Monday	\$16.50, \$27.75, \$18, \$28.46, \$32.68	\$25.75, \$15, \$1.75, \$24.60
Tuesday	\$18.95, \$27.63, \$100.90	\$45, \$26.50, \$8
Wednesday	\$43.65, \$64.82, \$90.75, \$84.38	\$115.75
Thursday	\$62.50, \$8.25, \$97.54, \$125	\$75, \$52.25
Friday	\$82.25, \$75, \$24.35, \$86.24, \$92.50	\$125, \$25.50
Saturday	\$175, \$248.40, \$16.75, \$13.50	\$225, \$15.75

- 1. Find the balance at the end of each day.
- 2. Find the balance at the end of the week.
- 3. How much more had Mr. Gordon to his account at the end of the week than at the beginning?

142. Finding Interest from a Graph

It is possible to approximate interest by using the graph on page 211. From this graph you can find the interest for 1 year at 4% or 6% on principals to \$1000. To find the interest for more than one year or for a part of a year, multiply the interest for one year by the appropriate whole number or fraction.

For example, to find the interest on \$200 at 4% for 1 year, find \$200, the principal, on the graph and run your finger up the vertical line until it crosses the 4% rate line. Then move your finger to the left along the horizontal line to the interest, which is \$8. For 2 years the interest would be $2 \times \$8$, or \$16. For 6 months it would be $\frac{1}{2} \times \$8$, or \$4.



Use the graph in solving the following problems:

- Find the interest on \$600 for 1 year (a) at 6%;
(b) at 4%.
- Find the interest on \$400 for 1 year (a) at 4%;
(b) at 6%.
- What is the interest on \$800 for 1 year (a) at 6%;
(b) at 4%?
- What is the interest on \$500 for 1 year (a) at 6%;
(b) at 4%?
- Find the interest on \$700 for 1 year (a) at 4%;
(b) at 6%.
- Find the interest on \$900 at 6% (a) for 1 year;
(b) for 2 years.
- What is the interest on \$1000 at 4% (a) for 1 year;
(b) for 2 years; (c) for 3 years?

8. Find the interest on \$300 at 4% (a) for 4 months; (b) for 8 months; (c) for 6 months.

9. Find the interest on \$600 at 6% (a) for 6 months; (b) for 3 months; (c) for 9 months.

*10. Find the interest (a) on \$1200 for 1 year at 6%; (b) on \$2000 for 1 year at 4%; (c) on \$1600 for 1 year at 4%.

11. Make up a problem to be solved from the graph.

What principal will earn \$24 in 1 year at 4%?

To solve this problem, find \$24 in the interest column; then move your finger to the right along the horizontal line until it crosses the 4% rate line; then follow down on the vertical line to the principal, which is \$600.

12. What principal will earn \$30 in 1 year at 6%?

13. What principal at 4% will earn \$20 in 1 year?

14. What principal at 4% will earn \$30 in 1 year?

15. What principal at 6% will earn \$48 in 1 year?

16. What principal at 4% will earn \$28 in 1 year?

17. Verify the answers in Problems 4, 8, and 12.

*18. A business man borrowed a sum of money for 6 months at 6%. If he had to pay \$30 interest, what sum did he borrow?

*19. Construct a similar graph that will show interest at 2%, 3%, 5%, 7%, 8%.

(HINT: Find the interest line for 2% on \$1000. Draw the rate line from 0 to this point.)

20. Make up problems similar to Problems 1–16 that can be solved from your graph.

143. Problems in Interest

1. What is the interest on \$2250 for $1\frac{1}{2}$ years (a) at 6%? (b) At 5%?

2. Mr. Williams borrowed \$4750 from his bank at 6%. (a) How much interest must he pay every six months? (b) How much must he pay in interest if the loan runs for $2\frac{1}{2}$ years?

3. A man borrows \$1850 at 5%. How much interest is paid on the debt in 3 years?

4. What is the interest on \$690 at 4% for 2 years 6 months?

5. A senior in college borrows \$250 from the Student Aid Fund to help him through the year. How much does he pay in interest at 4% if he keeps the money for 1 year 6 months?

6. Mr. Jones wishes to buy a lot which costs \$3500. He has \$3000 on hand. If he borrows the remainder from his bank for 60 days at 6%, what does the lot really cost him?

7. Mr. Franklin has the following sums out at interest: \$750 at 5%; \$1280 at 4%; \$1075 at 6%. How much does he receive in interest each half-year?

8. Find the interest on each of the following sums, at the rate given, and for the time indicated:

<i>Principal</i>	<i>Rate</i>	<i>Time</i>	<i>Principal</i>	<i>Rate</i>	<i>Time</i>
(a) \$500	4%	2 years	(f) \$430	5%	1 yr. 9 mo.
(b) \$720	5%	2 yr. 3 mo.	(g) \$1450	6%	60 days
(c) \$650	6%	1 yr. 6 mo.	(h) \$385	4%	30 days
(d) \$775	6%	2 yr. 10 mo.	(i) \$2470	5%	2 yr. 8 mo.
(e) \$340	4%	1 yr. 3 mo.	(j) \$425	4%	90 days

144. Compound Interest

1. Find the compound interest on \$400 for 2 years at 4%, payable half-yearly.

2. (a) What is the simple interest on \$620 for 2 years at 4%? (b) What is the compound interest on the same principal, for the same time, at the same rate, interest compounded semiannually? (c) What is the difference between the simple and the compound interest?

3. When James Leslie was 12 years old, his father placed \$250 to his account in the Newton Savings Bank at 4% compound interest. What will this sum amount to in 2 years, if the interest is compounded every six months?

4. If \$1250 is deposited at 4%, compounded semiannually, what will it amount to in 2 years?

5. Compute the compound interest on a deposit of \$385 compounded semiannually for 1 year 6 months at 4%.

6. Julia has \$380 on deposit in a savings bank which pays interest at 4% payable half-yearly. If the account is left undisturbed for 2 years, how much will Julia have on deposit?

*7. How would you find the compound interest on \$800 left to draw interest for 3 years at 4%, compounded semiannually?

145. Problems in Percentage

1. A car averaged 16.4 mi. per gallon of gasoline before the carburetor was adjusted. After the adjustment it averaged 20.5 mi. What was the per cent of increase in mileage?

2. Membership in the City Club increased from 400 to 475. What was the per cent of increase?

3. During the school year the register of a school increased 400. This was 25% of the register on the first day in September. What was the register on the last day of June?

4. An auditorium seats 550 pupils. If there are 2200 pupils in the school, what per cent can be seated at a time?

5. Mr. Dean bought an old house for \$3600. He spent \$1400 to repair and paint the house and then sold it at a profit of 15%. What was the selling price?

6. A farmer with a herd of 180 cows sold $16\frac{2}{3}\%$ of the herd at an average price of \$115 each. What did he receive for the cows he sold?

7. A grocer bought a case containing 240 oranges. He found that 24 were spoiled. What per cent were good?

8. Find the standing of each team for 1928. Rearrange the teams in each league in order of standing, placing the highest at the top.

AMERICAN LEAGUE			NATIONAL LEAGUE		
<i>Team</i>	<i>Won</i>	<i>Lost</i>	<i>Team</i>	<i>Won</i>	<i>Lost</i>
Boston	57	96	Brooklyn	77	76
New York	101	53	Philadelphia	43	109
St. Louis	82	72	New York	93	61
Cleveland	62	92	Pittsburgh	85	67
Detroit	68	86	Boston	50	103
Philadelphia	98	55	Cincinnati	78	74
Chicago	72	82	St. Louis	95	59
Washington	75	79	Chicago	91	63

9. A farmer has an average income of \$1600 a year. This represents 8% of the sum he invested in the farm. How much money is invested in the farm?

10. Mr. Jackson bought a hundred-acre farm for \$12,500. He sold it for \$15,000. What was the per cent gain per acre?

146. Problems in Commission

1. A real-estate agent sold 3 lots for \$750, \$975, and \$1025, respectively. What was his commission at 5%?

2. For selling real estate an agent charges $4\frac{1}{2}\%$ commission. How much should he receive for selling 5 lots at \$2250 each?

*3. A traveling salesman earned \$3600 last year, of which \$1200 was salary. The remainder was his commission at 5% on sales. What was the amount of his sales last year?

4. A lawyer collected 80% of a debt of \$2560 at 5% commission. How much did the creditor receive?

5. Find the net proceeds of a sale of 450 bbl. of potatoes at \$3.75 per barrel. Commission, 3%.

6. A fruit grower shipped 1200 baskets of peaches to his agent, who sold them at \$.75 per basket. The freight charges amounted to \$45.50; the rate of commission was 3%. (a) What was the agent's commission? (b) How much did the grower receive?

7. A commission merchant sold 1240 bu. of wheat at $\$1\frac{1}{4}$ per bushel. He deducted 50% for commission. What were the net proceeds of the sale?

8. A cotton broker bought 500 bales of cotton for a New England mill. The cotton weighed 245,000 lb. and sold for $22\frac{1}{2}\text{¢}$ per pound. Find the commission at 5%.

9. I shipped my agent 380 bbl. of apples which he sold at \$2.75 per barrel on a 5% commission. (a) His commission was ____; (b) the net proceeds were ____.

10. An auctioneer sells at auction the following: 2 chairs at \$7.50 each; 3 rugs at \$18.75 each; a buffet for \$39.50. What is his commission at 2%?

147. Miscellaneous Problems

1. How long will it take to travel 1254 mi. by train at an average speed of 45.6 mi. per hour?

2. What must Mr. Sanford pay for 3 carloads of brick, each containing 8000 bricks, at \$27.50 per thousand?

*3. How many pint bottles can be filled from 4 cans containing 20 gal. each?

4. What is the area of a rectangular plot of ground which measures 18 ft. 6 in. by 100 ft.?

5. A school buys 180 half-pint bottles of milk daily at $4\frac{1}{2}\text{¢}$ a bottle. The milk is sold at 5¢ a bottle. How many additional bottles can be bought with the difference between the total cost and the total selling price?

6. A cubic foot of ice weighs 56.8 lb. How many pounds are there in a cake of ice 4 ft. long, 3 ft. wide, and $1\frac{1}{4}$ ft. thick?

7. What will 16,250 lb. of coal cost at \$14.50 a ton?

8. Fred worked 26 days for \$7.50 a day. He deposited 20% of his earnings in the bank. How much did he deposit?

9. John has a camera that takes moving pictures. Each separate picture in the reel measures $\frac{3}{4}$ in. in height. How many pictures are in a reel 150 ft. long?

10. Mr. Wallace's bill for coal for an apartment house amounted to \$645 for 60 T. He paid cash and was allowed a discount of 10%. At this rate, what was the net cost per ton?

11. How far will a train travel in 24.5 hr. if the average speed is 42.8 mi. per hour?

12. Mary works 8 hr. a day for 6 days in the week at 40¢ an hour. If her pay is increased to 45¢ an hour, how much more will she earn in a week?

13. A farmer sold 4 loads of hay weighing as follows: 2 T. 250 lb.; 1 T. 750 lb.; 2 T. 500 lb.; 1 T. 750 lb. (a) What was the total weight of the hay? (b) At \$10 a ton, what did he receive for the hay?

14. Mr. Brown sold an automobile for \$1680. This was 70% of the cost. What did the automobile cost him?

15. A train leaving Cleveland at 8 A.M. reaches Washington at 10.15 P.M. The distance traveled is 489 mi. What is the average mileage per hour?

16. The school record for the running high jump is 6 ft. $5\frac{1}{2}$ in. Walter can jump 5 ft. $11\frac{1}{2}$ in. How far is he below the record?

17. The owner of a stationery store bought a gross of pencils for \$4.80. He sold them at 5¢ each. What is the per cent of profit on the gross?

18. There are 244,000 Indians in the United States. Of this number, 5500 live in New York. What per cent live in New York?

19. A cubic foot of water weighs 62.5 lb. What is the weight of the water in a tank with a capacity of 72.8 cu. ft. if the tank is only half full?

20. When Mr. Gordon started on a trip, the speedometer registered 6500.2 mi. After the first day it registered 6750.8 mi. The next day it registered 6925.1 mi., and on the last day it registered 7210 mi. (a) How far did Mr. Gordon travel each day? (b) What was the average mileage per day?

21. In 1928, Haldeman and Stinson remained aloft in their airplane for 53 hr. 36 min. 30 sec. In the same year, Zimmerman in Germany stayed aloft 65 hr. 25 min. How much longer did Zimmerman remain in the air than Haldeman and Stinson?

22. A dealer buys blank books for $4\frac{3}{4}\text{¢}$ each and sells them at 8¢ each. What does he make on 10 doz. books?

23. Mrs. Waldon ordered a dozen apples at the rate of 4 for 15¢, $1\frac{1}{2}$ doz. oranges at 60¢ a dozen, and $\frac{1}{2}$ doz. bananas at 3¢ each. How much change should she receive from \$5?

24. A farmer planted 60 A. in wheat. The yield was 35.5 bu. per acre. At \$1.45 a bushel, what did he receive for the wheat?

25. What is the area of a right triangle with a base of $64\frac{1}{2}$ ft. and an altitude of $27\frac{3}{4}$ ft.?

26. Mr. Stuart built a new barn at a cost of \$1250. He paid \$750 down and agreed to pay \$250 semiannually until the barn was paid for. How long will it take him to pay for the barn?

27. A commission merchant sold 1250 bu. of wheat at \$1.15 a bushel and 500 bu. of oats at \$.80 a bushel. He deducted 5% and sent a check to his client for the balance. What was the amount of the check?

28. What is the area of a triangular garden plot having one square corner, a base measuring 12 ft., and an altitude of 12 ft.?

29. Mr. Wallace borrowed money on June 15, 1929, and paid it back on May 20, 1930. How long did he have the money?

148. Step-by-Step Test Drill — Application of Percentage. I

		A	B	C	D	E
1.	Cost Rate of Gain Selling Price	\$5000 200% ?	\$12,000 100% ?	\$8000 100% ?	\$15,000 300% ?	\$16,000 200% ?
2.	Amount of Sale Rate of Commission Net Proceeds	\$50,000 2½% ?	\$26,500 5¼% ?	\$18,000 3¾% ?	\$20,000 4½% ?	\$64,000 5½% ?
3.	Cost Selling Price Rate of Loss	\$5250 \$3150 ?	\$6400 \$4800 ?	\$18,000 \$2250 ?	\$24,000 \$15,000 ?	\$18,600 \$12,400 ?
*4.	Amount of Sale Net Proceeds Rate of Commission	\$600 \$570 ?	\$800 \$760 ?	\$1000 \$900 ?	\$2000 \$1960 ?	\$2400 \$2328 ?
*5.	Gain Per Cent of Gain Cost	\$200 62½% ?	\$1600 16⅔% ?	\$5200 40% ?	\$1600 25% ?	\$1800 37½% ?
*6.	Commission Per Cent of Com- mission Amount of Sale	\$40 5% ?	\$36 9% ?	\$400 2% ?	\$300 4% ?	\$600 3% ?
7.	List Price Discount Net Price	\$75 33⅓% ?	\$200 12% ?	\$1600 25% ?	\$3200 8% ?	\$1400 75% ?
*8.	List Price Net Price Per Cent of Discount	\$2.50 \$1.50 ?	\$6.00 \$3.75 ?	\$6.25 \$4.00 ?	\$25.00 \$17.50 ?	\$120 \$90 ?
9.	List Price Discounts Net Price	\$600 3%, 8% ?	\$940 20%, 5% ?	\$7000 25%, 5% ?	\$8000 10%, 5% ?	\$14,000 15%, 10% ?

149. Step-by-Step Test Drill — Application of Percentage. II

		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1.	Principal Rate Time Interest	\$380 6% 2 yr. ?	\$470 7% 3 yr. ?	\$286 5% 6 yr. ?	\$184 5% 3 yr. ?	\$282 4% 4 yr. ?
2.	Principal Rate Time Amount	\$340 6% 2 yr. 6 mo. ?	\$234 5% 1 yr. 6 mo. ?	\$2500 4% 2 yr. 3 mo. ?	\$5580 3% 2 yr. 10 mo. ?	\$3500 5% 1 yr. 4 mo. ?
3.	Principal Rate Time Amount	\$4250 6% 30 da. ?	\$10,500 6% 30 da. ?	\$7500 6% 30 da. ?	\$10,800 6% 30 da. ?	\$12,300 6% 30 da. ?
4.	Principal Rate Time Amount	\$720 4% 30 da. ?	\$3200 4% 30 da. ?	\$6500 4% 30 da. ?	\$3600 4% 30 da. ?	\$690 4% 30 da. ?
5.	Principal Rate Time Amount	\$3663 6% 60 da. ?	\$4242 6% 60 da. ?	\$6200 6% 60 da. ?	\$2400 6% 60 da. ?	\$3600 6% 60 da. ?
6.	Principal Rate Time Amount	\$4242 6% 90 da. ?	\$6200 6% 90 da. ?	\$2400 6% 90 da. ?	\$3600 6% 90 da. ?	\$3663 6% 90 da. ?
7.	Principal Rate Time Quarterly Compound Interest	\$1350 4% 1 yr. ?	\$2500 4% 1 yr. ?	\$720 4% 1 yr. ?	\$1280 4% 1 yr. ?	\$1850 4% 1 yr. ?

150. Same — Different Test

Read each pair of statements. If they are the same, write "Same." If they are different, write "Different."

Example:

25% of 60 _____ Same _____ $\frac{1}{4}$ of 60
 25% of 60 _____ Different _____ 2.5×60

1. $\frac{25}{40}$ _____ $\frac{7}{8}$
2. $5\frac{1}{2}\%$ of \$6000 _____ 5.5 of \$6000
3. 300% of 70 _____ $.3 \times 70$
4. 2 qt. _____ 50% of 1 gal.
5. 87 ft. _____ 29 yd.
6. $\frac{3}{4}$ hr. _____ 40 min.
7. $112\frac{1}{2}\%$ of 2400 _____ $\frac{9}{8} \times 2400$
8. 144 sq. in. _____ 1 sq. yd.
9. 4.5% of 632 _____ $.045 \times 632$
10. $5 \times \$5000$ _____ 500% of \$5000
11. $37\frac{1}{2}\%$ of 850 _____ $\frac{7}{8}$ of 850
12. $\frac{3}{4}$ of 64 _____ .75 of 64
13. 150% of 650 _____ $.15 \times 650$
14. 5280 ft. _____ 1760 yd.
15. .5 of 1 T. _____ 1000 lb.
16. $16\frac{2}{3}\%$ of 3000 _____ $.66\frac{2}{3} \times 3000$
17. 3 sq. ft. _____ 1 sq. yd.
18. 1.5 hr. _____ 90 min.
19. $83\frac{1}{3}\%$ of 2400 _____ $\frac{7}{8}$ of 2400
20. 75% of \$480 _____ \$360
21. 100×596 _____ 5960

22. $.78$ _____ $780 \div 1000$
23. $.0325 \times 100$ _____ $3\frac{1}{4}\%$ of 100
24. $62\frac{1}{2}\%$ of 1600 _____ $\frac{2}{3}$ of 1600
25. 7.5×500 _____ $7\frac{1}{2} \times 500$

151. Completing Sentences

1. To find the interest on a given sum, I must know the _____, _____, and _____.
2. To find the net proceeds, I subtract the _____ from the _____.
3. There are two kinds of bank accounts, _____ and _____.
4. Expenses that are necessary to carry on a business are called _____.
5. Money received for services on a weekly, monthly, or yearly basis is called a _____.
6. Money received for executing an order or selling goods is called _____.
7. The principal plus the interest is called the _____.
8. A plan for spending money is called a _____.
9. The amount of money a family has to live on is called the _____.
10. The amount of money that is left to your account in a bank is called the _____.
11. When goods are bought for less than the list price, they are bought at a _____.
12. A triangle with a right angle is called a _____ _____.
13. A four-sided figure with four right angles is called a _____.
14. When a small line is used to represent a long line, the drawing is made _____ _____.

152. Foreign Money

American manufacturers and merchants have established an extensive trade with many foreign countries, as you have learned from your study of geography. American imports and exports run into vast sums yearly. This is especially true with respect to certain European countries.

Again, many Americans travel abroad each year, and many foreigners visit our land.

In our trading with foreign lands, it becomes necessary for us to exchange United States money for foreign money. For example, in trading with England, United States money must be exchanged for its equivalent in value in English money. An American about to travel in France would exchange his money for French money. Therefore, it is necessary for us to learn something of the money systems of certain foreign countries.

United States money is based upon the decimal system.

$$10 \text{ cents} = 1 \text{ dime.}$$

$$10 \text{ dimes} = 1 \text{ dollar.}$$

Instead of learning the above table, the English school-boy learns:

$$12 \text{ pence (d.)} = 1 \text{ shilling (s.)}$$

$$20 \text{ shillings} = 1 \text{ pound (£)}$$

The English penny is worth approximately 2¢; the English shilling is worth approximately 25¢ (24.33¢); the English pound is worth approximately \$5 (\$4.8665).

*What is the approximate value in United States money of 2 s.? Of 5 s.? Of 10 s.?

*What is the value of the English £?

The French schoolboy learns:

$$100 \text{ centimes (c.)} = 1 \text{ franc (fr.)}$$

Before the World War, the franc was equivalent in value to about 20¢ of our money (\$.193). This was its par value. Today, the franc is worth about 4¢. This is its exchange value.

* About how many francs would you receive today in exchange for a dollar bill?

* What is the approximate value today of 10 fr.? Of 50 fr.?

The German schoolboy learns:

$$100 \text{ pfennig (pf.)} = 1 \text{ mark (M.)}$$

The German mark today is worth about 25¢ (\$.2382).

* What is the approximate value of 10 M. in our money? Of 50 M.?

* About how many marks would you receive in exchange for \$2? For \$10?

The Italian schoolboy learns to use the lira, a coin which is equivalent to about 5¢ of our money (\$.05236). A one-dollar bill, then, could be exchanged for _____ lire.

* What is the approximate value of 5 lire? Of 40 lire?

* About how many lire would you receive in exchange for \$2? For \$5?

TABLE OF EQUIVALENTS

<i>Country</i>	<i>Unit</i>	<i>Exact Value</i>	<i>Approximate Value</i>
England	shilling	\$.2433	\$.25
	pound	\$4.8665	\$5.00
France	franc	\$.039179	\$.04
Germany	mark	\$.2382	\$.25
Italy	lira	\$.05236	\$.05

***153. Problems**

1. An American merchant paid a French manufacturer 50 fr. each for lace collars. Each collar would be worth about ____ in United States money.

2. A certain book is sold in Paris at the cost of 10 fr. What would it cost in our money?

3. A traveler paid 10 M. for a German book. It would cost ____ in United States money.

4. An American traveling in England exchanged \$25 for English money. He received about ____.

5. Mr. Johnson bought an overcoat in London for £5. That would be equivalent to about ____ in United States money.

6. In a certain shop in Rome, copies of famous paintings were sold at 1000 lire each. In our money they would cost \$____.

7. An Englishman exchanged £200 for United States currency. How much did he receive?

8. One dollar of our money is worth about ____ fr. in Paris; ____ M. in Berlin; ____ lire in Italy.

9. Flora Jones wrote to her cousin Jeanne in Paris: "I have a new copy of *Alice in Wonderland*, which cost two dollars." Jeanne thought, "Flora paid ____ fr. for her book."

10. Complete this table:

<i>Country</i>	<i>Coin or Note</i>	<i>Abbreviation</i>	<i>Approximate Value in U. S. Money</i>
France	pound		
		M.	
	lira		

154. Taxes

Every child who has studied American history knows that the cry of "No taxation without representation" had a great deal to do with the Revolutionary War. Every father or mother who owns property or who has an income has talked about taxes. People who come back to America from foreign countries meet a customs officer who looks over what is brought in to see whether a duty should be paid. Let us see what taxes mean and what they have to do with us as individuals.

We live in a great city. We see about us policemen, firemen, street cleaners, and many others who are employees of the city. We go to a public school where we find teachers and principals and where we are furnished with textbooks and supplies. We go through the streets and find them being repaved and lighted. We go into our homes and find water supplied in our apartments and houses. We hear of a mayor, of a judge, of dock departments, bank departments, health departments, hospitals, prisons, and of a number of other city activities. Do we always stop to think how these are paid for? We say the "city" pays for them. That is true, but the city government cannot get its money for these activities except through its citizens. This means that your parents and all other members of the community must raise the money necessary to provide these advantages. This money is raised by taxation, and the different forms of raising it are called *taxes*.

Every year our city government makes a careful estimate of how much money will be needed to carry on the work of the government for the following year. This is

called making the city budget. Each department of the government, education, police, health, fire, and so on, has a separate estimate made for its needs. The sum of all these estimates for all the departments of government is called the *budget*. The city now has to plan how to raise this money by taxes. Taxes for the city are generally a per cent of the estimated value of real property and personal property.

Real property means land and the buildings on it.

Personal property is movable property such as furniture, mortgages, or live stock.

The *tax rate* is a very important matter. Lowering or raising it means much to the taxpayer. Let us see how the tax rate is found.

Suppose that a small town plans a budget of \$21,000 for next year. This means that \$21,000 must be raised by taxation. Since the amount raised by taxes on personal property is usually small, we shall calculate how the whole amount could be raised on the real estate of the town. The tax assessor estimates the value of all the real estate of the town at \$875,000. Then \$21,000 must be raised on \$875,000.

$$\frac{21000}{875000} = \frac{21}{875} = .024 = \text{tax rate}$$

This may be read as 24 mills on each dollar of assessed valuation, or as \$2.40 on each hundred dollars, or as \$24 on each thousand dollars.

A property owner whose property is assessed at \$1000 would pay \$24; one whose property is assessed at \$2000

would pay \$48 tax. How much would one whose property is assessed at \$1500 pay? One whose property is assessed at \$5000? One whose property is assessed at \$7500? One whose property is assessed at \$20,000?

155. Problems

1. The tax rate is \$1.84 per hundred. How much tax must a man pay on property assessed at \$35,500?

2. Property worth \$60,000 is assessed at $\frac{4}{5}$ of its real value. What will the tax amount to if the rate is \$.015 on the dollar?

3. The value of Mr. Henry's property is \$45,000. How much will the tax be if the rate is \$18.50 per thousand?

4. Three years ago the assessed valuation of property in a town was \$750,000. This year it is \$810,000. The tax rate for both years was \$.025 per dollar. How much more in taxes was raised this year than three years ago?

*5. A man owns property valued at \$50,000. In 1925 it was assessed at 60% of its value. The tax rate in 1925 was \$20.50 per thousand. In 1929 it was assessed at 75% of its value. The tax rate in 1929 was \$19.50 per thousand. In which year were his taxes higher, and how much higher were they?

6. Find the tax on each of the following:

	<i>Value of Property</i>	<i>Assessed at</i>	<i>Rate per hundred</i>
(a)	\$120,000	90% of value	\$1.42
(b)	\$65,000	60% of value	\$2.40
(c)	\$7,000	100% of value	\$1.54
(d)	\$82,000	75% of value	\$1.76
(e)	\$38,000	70% of value	\$2.02

156. United States Government Taxes — Customs and Duties

Our national government must raise money for its various activities just as the state and the city do. It does not tax real estate, however, but levies taxes on other things. It raises great sums on the incomes of individuals and corporations. Persons with smaller incomes pay not only less but at a lower rate than persons with large incomes. The national government also levies taxes on goods imported into the United States from foreign countries. You have learned something about this kind of tax from your history, particularly from discussions of the *tariff*. Taxes on goods imported from other countries are called *customs* or *duties*. They are levied either to raise money to support the government or to prevent poorer-paid foreign workmen from selling goods at such low prices in our country that our better-paid American workmen would be thrown out of work or forced to accept lower wages.

Duties or customs are not levied on all imported goods. Some goods are admitted free. Goods that are taxed may be divided into three classes:

1. Goods taxed on their cost or value. Such goods are subject to an *ad valorem* duty, which is a certain per cent of the value of the goods as stated in their invoice.

2. Goods taxed according to quantity; that is, a certain amount per yard or per pound. This is called *specific duty* and does not consider the value of the goods.

3. Goods that are subject to both an *ad valorem* and a *specific duty*.

State which kind of duty is levied in each of the following cases:

1. The duty on bacon is 2¢ a pound.
2. The duty on corn is 15¢ a bushel.
3. Lace is subject to a duty of 90% of its value.
4. Barley is subject to a duty of 20¢ a bushel.
5. Cotton cloth is subject to a duty of from 10% to 45% of its value.
6. The duty on lard is 1¢ per pound.
7. Wool blankets are subject to duty as follows: from 30% to 40% of value and 18¢ to 37¢ a pound, depending on the quality.
8. On Oriental rugs the duty is 55% of the value.
9. Printing paper is subject to a duty of 10% of the value and $\frac{1}{4}$ ¢ a pound.
10. The duty on scissors is 45% of the value and from $3\frac{1}{2}$ ¢ to 20¢ each.

157. Using Graphs for Comparisons

Construct graphs from the information given:

1. The value of the rubber imported by the United States from certain countries in one year was as follows:

Brazil	\$12,000,000	Dutch East Indies	\$87,000,000
Ceylon	\$45,000,000	Malaya	\$315,000,000

2. The value of the silk imported from China by one country in one year was \$50,000,000. The value of the silk imported from Japan by the same country for the same period was \$390,000,000.

3. The following figures show the value of the exports to and imports from the countries listed made by the United States in one year:

<i>Country</i>	<i>Exports</i>	<i>Imports</i>
British South Africa	\$50,000,000	\$10,000,000
Australia	\$160,000,000	\$40,000,000
China	\$85,000,000	\$150,000,000
Japan	\$260,000,000	\$400,000,000
Philippine Islands	\$70,000,000	\$115,000,000

158. Problem Analysis

1. Before attempting to solve the problem, read it carefully.

2. Ask yourself:

- (a) What facts are given?
- (b) What am I to find?
- (c) What is the first step? How shall I solve it?
- (d) What is the next step? How shall I solve that?
- (e) Are there any more steps?
- (f) What is a reasonable answer?

3. Work the problem step by step. Check your answer.

1. What will it cost to excavate a cellar 24 ft. long, 21 ft. wide, and 12 ft. deep at 75¢ per cubic yard?

2. A contractor worked on a job which cost him \$3600 to complete. He wished his profit to be $12\frac{1}{2}\%$ of the cost. What did he charge the man who employed him in order to make this profit?

3. What is the per cent of gain on silk bought at \$1.50 a yard and sold at \$2.25 a yard?

4. A farmer sells his produce through a commission merchant who charges 10% commission. What will the farmer receive for a load of produce which sells for \$500?

5. A mechanic earns \$3640 a year. He saves $12\frac{1}{2}\%$ of his money. At this rate, how much will he save in 4 years?

6. Find the cost of railroad tickets for a family of 5 adults for a trip 800 mi. long at $3\frac{1}{2}\text{¢}$ a mile.

7. The list price of an article is \$46.50. It is marked down 40%. What must I pay for it?

8. (a) How many feet of chicken wire are needed to inclose a garden $49\frac{1}{2}$ ft. wide and $62\frac{1}{2}$ ft. long? (b) At 12¢ a yard, what will it cost to inclose the plot?

9. The governor of a state receives \$25,000 a year. The mayor of a city in that state receives \$45,000 a year. What per cent of the mayor's salary is the salary of the governor?

10. Frank left for the country on the 9.20 A.M. train. He reached his destination at 12.15 P.M. How many minutes did he spend on the train?

11. The distance from New York to Boston by boat is 305 nautical miles. A nautical mile is equivalent to 1.152 statute miles. What is the distance in statute miles?

12. The distance from Chicago to Washington is 874 miles. The trip is made in 28.5 hr. What is the average mileage per hour?

13. Mr. Wilson borrowed \$8000 from the bank on February 1, 1930. He paid it back with interest on September 1, 1930. How much did he return to the bank?

14. The assessed valuation of real estate in a town is \$250,000. If the budget is estimated at \$20,000, what will the tax rate be?

*15. A clerk saves 8% of his salary. If his savings amount to \$12 per month, how much does he earn in a year?

159. Supplying the Question

Example: A train leaving at 1.15 reaches its destination at 1.45. The distance is 18 mi.

- (a) How long did it take to make the trip?
- (b) At that rate, how far would the train travel in an hour?
- (c) What is the average speed per minute?
- (d) About how many miles have been traveled at 1.30?

Complete each problem by supplying a question. Then solve the problem:

1. The catalogue price of an article is \$24.50. The cash purchaser is allowed 20% discount.

2. A house which was bought for \$11,500 was sold for \$15,000.

3. Mr. Edward's average sales amount to \$2500 a week. He receives 8% commission.

4. An agent sold Mr. Brown's 125-acre farm at \$75 an acre. He charged 5% commission.

5. Mr. Baird borrowed \$1500 from the bank for one year at 6%.

6. A farmer with a 250-acre farm planted 75 acres in wheat.

7. In a recent election, 125,000 persons were entitled to vote. Only 85,000 voted.

8. There were 480 pupils enrolled in a summer school. Of this number, 85% were promoted.

9. Mr. Spear invested \$15,000 and earned a profit of \$675. Mr. Barrows invested \$12,500 at a profit of \$650.

10. Gold production in the United States dropped from about \$101,000,000 in 1915 to about \$45,100,000 in 1927.

160. Approximating Answers

Example: The catalogue price for a lawn mower is \$12.50. A special discount of 10% was allowed Mr. Ford. What was the net price?

\$11.25 \$10 \$1.25 \$13.75

Think: 10% of \$12.50 = \$1.25; \$12.50 - \$1.25 = \$11.25.

In the following problems, select from the four answers the one which is right:

1. A dealer allowed a farmer 10% off for paying cash for his reaper. The discount amounted to \$14.50. What was the regular price?

\$145 \$1450 \$160 \$130.50

2. Find the area of a right triangle with a base of 45 ft. and an altitude of 20 ft.

900 sq. ft. 450 sq. ft. 200 sq. ft. 810 sq. ft.

3. A man bought a lot for \$1500 and sold it for \$3000. What was the gain per cent?

30% 10% 15% 100%

4. An article bought for \$2.40 was sold at a discount of $12\frac{1}{2}\%$. What was the selling price?

\$12.50 \$2.10 \$1.60 \$2.70

5. A real-estate dealer sold a house for \$24,000. His commission rate was 4%. How much money was due the owner?

\$23,040 \$20,000 \$24,960 \$960

161. Selecting the Operation

From the three suggested solutions select the one that is correct, and on a paper write it after the number of the problem:

1. An agent collected 75% of a debt amounting to \$9000. How much did he collect?

$$75 \times \$9000$$

$$\frac{3}{4} \text{ of } \$9000$$

$$7.5 \times \$9000$$

2. For what price must a merchant sell a coat that costs \$75 in order to gain $33\frac{1}{3}\%$?

$$.33\frac{1}{3} \times \$75$$

$$33\frac{1}{3} \times \$75$$

$$\$75 + (\frac{1}{3} \text{ of } \$75)$$

3. A stationery dealer buys pencils at \$4.50 a gross and sells them at 5¢ each. How much does he make?

$$\$4.50 - (12 \times \$.05) \quad (144 \times \$.05) - \$4.50 \quad \$4.50 \div 144$$

4. A record for the running high jump is 6 ft. 5 in. Fred can jump 5 ft. 8 in. How much higher must he jump before he reaches the record?

$$6 \text{ ft. } 5 \text{ in.} - 5 \text{ ft. } 8 \text{ in.}$$

$$5 \times 8 \text{ in.}$$

$$5 \text{ ft. } 8 \text{ in.} + 6 \text{ ft. } 5 \text{ in.}$$

5. At \$.60 an hour, what will a man receive for working 35 hr. and 45 min.?

$$(35 + 45) \times \$.60$$

$$35 \times \$.60$$

$$35\frac{3}{4} \times \$.60$$

6. Find the interest on \$900 for 1 year 3 months at 4%.

$$\frac{4}{100} \times \frac{5}{4} \times \$900 \quad \$900 \times 5 \times \frac{4}{100} \quad .04 \times \$900 + \frac{1}{4}$$

7. Wages in a factory were reduced $12\frac{1}{2}\%$. What will a man receive whose wages were \$16 a day before the cut?

$$.12\frac{1}{2} \times \$16$$

$$\frac{7}{8} \times \$16$$

$$\$16 - (.08 \times \$16)$$

8. How many quarter-pound packages can be made from 8 lb. of tea?

$$8 \div \frac{1}{4}$$

$$\frac{1}{4} \text{ of } 8$$

$$8 \times \frac{1}{4}$$

9. An aviator who flies to an altitude of 2.2 mi. has risen how many feet?

$$2.2 \times 1780$$

$$2.2 \times 5280$$

$$2\frac{1}{2} \times 5280$$

162. Changing the Wording of Problems

Example: What is the interest on \$6000 for 1 year at 6%?

(a) \$6000 loaned for 1 year at 6% will earn ____.

(b) The rate is 6%; the time, 1 year; the principal, \$6000. What is the interest?

Try to vary the wording of the following problems in as many ways as possible:

1. A cubic foot of water weighs 62.5 lb. What will $12\frac{1}{2}$ cu. ft. weigh?

2. Mr. Mead bought a house for \$12,600 and sold it for \$15,000. What was the rate of gain?

3. Railroad fare is \$.035 a mile. Find the cost of a ticket for a trip of 360 mi.

4. A man's yearly salary is \$4200. What is his monthly salary?

5. Mr. Ward has a yearly income of \$5000. He budgets his income, setting aside 30% for food. How many dollars does he allow for food?

6. A dress marked \$27.50 was offered for sale at a reduction of 20%. What was the selling price?

7. A man's yearly salary was raised from \$3000 to \$3500. What was the per cent of increase?

8. Mr. Walton invested \$13,000 in property which brought him an income of \$1300 yearly. What was the rate of return on his investment?

9. A holiday sale announcement read: "50 coats, 20% off." What was the selling price of the coats if they were originally priced at \$35?

163. Problems without Numbers

In each of the following problems, tell how you would solve the problem. Then supply reasonable figures for the missing numbers and find the answer:

1. A desk costing _____ is sold at a gain of _____%. What is the selling price?

2. Mr. Reid was forced to sell his automobile for _____ less than he paid for it. This was a loss of _____% of the cost. What was the cost to Mr. Reid?

3. A school team played _____ baseball games and won _____. What per cent of the games did it win?

4. Mrs. Robinson's gas meter read _____ on May 1 and _____ on June 1. At _____ per thousand, what will her gas bill amount to?

5. What is the average weight of _____ packages, weighing _____ lb., _____ lb., _____ lb., and _____ lb., respectively?

6. Mary's weekly deposits in the school bank were as follows: _____, _____, _____, _____, _____. What was her average deposit per week?

7. Mr. Dure drove his automobile _____ miles on _____ gallons of gasoline. What was the average mileage per gallon?

8. Mr. Roberts bought an automobile in 1924 for _____. A few years later he traded it in for a new car that cost

____. He gave the old car and ____ in cash. What was he allowed for the old car?

9. Mr. Moffat built a concrete walk in front of his property. It was ____ ft. wide and ____ ft. long. The cost was ____ per square foot. What was the total cost?

164. Silent Reading of Problems

After each problem you will find a question followed by four answers. Select the correct answer:

1. Mr. Stevens ordered groceries from a wholesale dealer to the amount of \$750. He paid cash and was allowed 6% discount. What did he have to pay for the goods?

Which of the following facts are given?

- (a) The amount of the discount.
- (b) The price Mr. Stevens paid.
- (c) The rate of discount.
- (d) The number of articles bought.

2. Mrs. Ward loaned \$250 for 2 years at 6%. How much will the principal earn for her?

Which of the following are you asked to find?

- (a) The interest earned in 1 year.
- (b) The interest earned in 2 years.
- (c) The amount.
- (d) The interest due semiannually.

3. Anna earns \$5 a week. She budgets her money as follows: savings, 50%; amusement, 20%; books and supplies, 30%. What sum does she set aside for each item?

Which of the following are you given?

- (a) The number of hours Anna works.
- (b) The amount she spends for books.
- (c) The per cent she saves.
- (d) Anna's earning per day.

4. A real-estate agent charges 5% for selling property. What price must he ask for the property in order to get a commission of \$100?

Which of the following are you asked to find?

- (a) The commission.
- (b) The cost of the property.
- (c) The price the agent must ask for the property.
- (d) The amount the owner will receive.

5. Is it better to be allowed $\frac{1}{4}$ off on a bill amounting to \$5 or to get a discount of 20%? How much would you save by taking the larger discount?

Which of the following facts are given?

- (a) The amount saved by taking $\frac{1}{4}$ off.
- (b) The amount saved by a discount of 20%.
- (c) The amount of the bill.
- (d) The saving by choosing the larger rate.

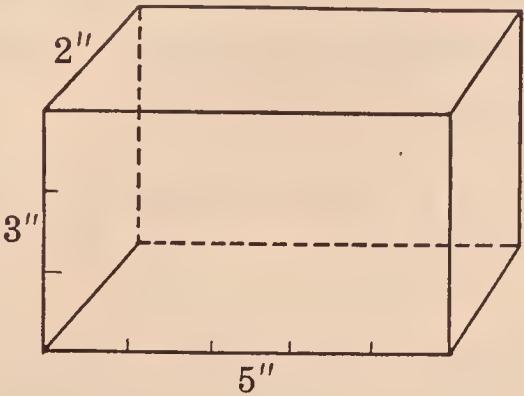
6. If an automobile depreciates 18% in value during the first year, what will a car that cost \$2400 be worth at the end of the year?

Which of the following are you asked to find?

- (a) The amount of depreciation.
- (b) The value of the car after 6 months.
- (c) The cost of the upkeep of the car.
- (d) The value of the car after 1 year.

165. Contents of Rectangular Solids

Compare this figure with a candy box, a match box, a chalk box. How many sides has it? What shape are the sides?

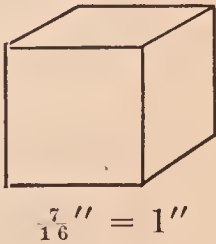


A solid that has six rectangular sides or faces is called a *rectangular solid*.

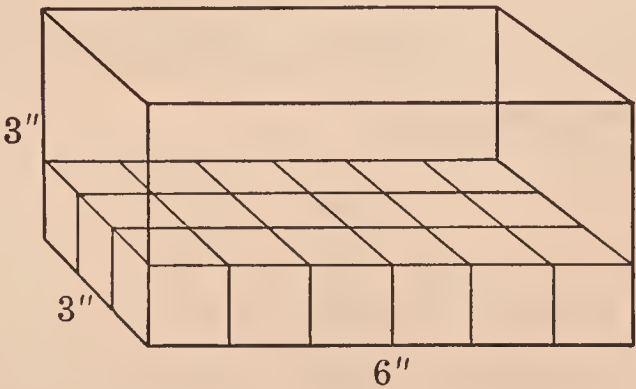
A rectangular solid has three measurements. This solid is ____ in. long, ____ in. wide, ____ in. high.

This solid has ____ square sides or faces, measuring ____ in. on each edge.

A solid that is 1 inch long, 1 inch wide, and 1 inch high is called a *cubic inch* or an *inch cube*.



This diagram shows the bottom layer of a candy box which is to be filled with caramels.



Each caramel is an inch cube.
How many caramels can be placed in one row?

How many cubic inches are there in one row?

How many rows can be placed in the lower layer?

How many caramels will there be in the lower layer?

How many such layers will the box hold?

How many cubic inches will the box hold?

Another way of saying that a box contains 54 cu. in. is to say that its *volume* is 54 cu. in.

$$3 \times 6 \times 3 = 54, \text{ the number of cubic inches}$$

The volume of a rectangular solid is equal to the product of the length, width, and height expressed in the same unit of measure.

The volume of a rectangular solid is sometimes called the *cubical contents*.

Use pencil if needed.

1. How many cubic inches are there in a brick 6 in. by 3 in. by 4 in.?

2. How many cubic inches are there in a box 9 in. by 2 in. by 3 in.?

3. How many inch cubes can be fitted into boxes with these inside measurements?

<i>Length</i>	<i>Width</i>	<i>Height</i>
(a) 5 in.	4 in.	3 in.
(b) 6 in.	5 in.	4 in.
(c) 4 in.	3 in.	2 in.
(d) 7 in.	6 in.	2 in.
(e) 8 in.	7 in.	6 in.

*4. How many cubic inches are there in (a) a 4-inch cube? (b) A 10-inch cube? (c) A 5-inch cube? (d) A 6-inch cube? (e) A 3-inch cube?

5. Find the volume of each rectangular solid:

- (a) 5'' by 6'' by 12'' (b) 6'' by 12'' by 14''
(c) 12'' by 4'' by 7''

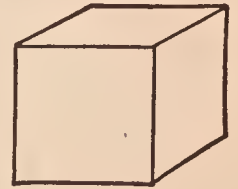
6. What is the cubical contents of each of the following boxes:

- (a) 12'' by 12'' by 12'' (b) 14'' by 8'' by 6''
(c) 12'' by 7'' by 9''

Cubical contents or volume may be measured in other cubic units than the cubic inch.

We pay for gas or water by the *cubic foot*. We speak of the number of cubic feet of air allowed each pupil in the classroom. Wood is bought and sold by the *cord*, which is equivalent to 128 cu. ft.

This cube is 1 ft. long, 1 ft. wide, and 1 ft. high. It is called a cubic foot.



$$\frac{7}{16}'' = 1'$$

To what scale is this cube drawn? Compare it with the scale for the drawing of the cubic inch. Is a cubic foot larger or smaller than a cubic inch?

At the blackboard draw a cubic inch. Next to it draw a cubic foot, using the exact measurements.

Without pencil.

7. How many cubic feet are there in a solid 4 ft. long, 2 ft. wide, and 3 ft. deep?

8. A cord of wood is 8 ft. long, 4 ft. wide, and 4 ft. high. How many cubic feet does it contain?

9. What is the volume of a rectangular solid measuring:

- (a) 15 ft. by 2 ft. by 3 ft. (b) 8 ft. by 6 ft. by 2 ft.
(c) 4 ft. by 6 ft. by 4 ft.

Use pencil if needed.

Find the capacity (cubical contents or volume) of the following:

10. A tank 9 ft. by 12 ft. by 11 ft.
11. A tank 8 ft. by 17 ft. by 15 ft.
12. A bin 12 ft. by 10 ft. by 8 ft.
13. A bin 15 ft. by 12 ft. by 8 ft.
14. A bin 20 ft. by $15\frac{1}{2}$ ft. by 10 ft.
15. A freight car 30 ft. by 9 ft. by $8\frac{1}{2}$ ft.

Contractors use a still larger cubic unit for measuring the amount of dirt that has been excavated.

A cubic yard is _____ yd. long, _____ yd. wide, and _____ yard _____.

Find the volume of a solid that measures:

16. 8 yd. $\times$ 5 yd. $\times$ 6 yd.
17. 7 yd. $\times$ 4 yd. $\times$ 2 yd.
18. 4 yd. $\times$ 5 yd. $\times$ 6 yd.
19. 8 yd. by 2 yd. by 3 yd.
20. 5 yd. by 4 yd. by 6 yd.
21. 3 yd. by 8 yd. by 2 yd.

Often dimensions are not given in the same unit of measure. Suppose that we wish to find the cubical contents of a bin that measures 8 ft. by 7 ft. by 6 in.

$$6 \text{ in.} = \frac{1}{2} \text{ ft.}$$

$$8 \times 7 \times \frac{1}{2} = 28, \text{ the number of cubic feet}$$

Change measurements to the same denomination, if necessary, and find the volume:

22. 6 ft. by 8 ft. by 3 in.
23. 5 ft. by 4 ft. by 6 in.
24. 8 in. by 9 ft. by 12 ft.
25. $8\frac{1}{2}$ ft. by 6 ft. by 4 ft.
26. 4 yd. by $2\frac{1}{2}$ yd. by 8 yd.
27. 8 yd. $\times$ 2 yd. $\times$ 2 ft.
28. 12 yd. $\times$ 3 yd. $\times$ 4 ft.
29. 6 yd. $\times$ 2 yd. $\times$ 4 yd.

30. 2 ft. $\times$ 6 yd. $\times$ 3 yd.
31. 7 yd. $\times$ 1 ft. $\times$ 2 yd.
32. A room 18 ft. long, 12 ft. 6 in. wide, and 9 ft. high.
33. A room 24 ft. long, 15 ft. 8 in. wide, 9 ft. high.
34. A bin 15 ft. 6 in. by 8 ft. 6 in. by 2 ft. 3 in.
35. A bin 5 yd. 1 ft. by 3 yd. 2 ft. by 2 yd.
36. A bin 6 yd. 2 ft. by 3 yd. 1 ft. by 3 yd.

166. Cubic Measure

The cubic inch, cubic foot, and cubic yard are the measures commonly used in finding volume or capacity.

Often it is necessary, in solving practical problems, to change from one unit of measure to another.

A cubic foot measures 12 inches for all three dimensions.

$12 \times 12 \times 12 = 1728$, the number of cubic inches in 1 cu. ft.

A cubic yard is ____ ft. long, ____ ft. wide, and ____ ft. high. A cubic yard is equal to ____ cubic feet.

$$1728 \text{ cu. in.} = 1 \text{ cu. ft.}$$

$$27 \text{ cu. ft.} = 1 \text{ cu. yd.}$$

Supply the missing numbers:

1. 2 cu. ft. = ____ cu. in.
2. $\frac{1}{2}$ cu. ft. = ____ cu. in.
3. $\frac{1}{4}$ cu. ft. = ____ cu. in.
4. ____ cu. in. = 3 cu. ft.
5. ____ cu. ft. = 2 cu. yd.
6. 81 cu. ft. = ____ cu. yd.
7. 36 cu. ft. = ____ cu. yd.
8. 8 cu. yd. = ____ cu. ft.
9. $\frac{3}{4}$ cu. ft. = ____ cu. in.
10. $\frac{5}{8}$ cu. ft. = ____ cu. in.
11. $\frac{7}{8}$ cu. ft. = ____ cu. in.
12. $\frac{3}{8}$ cu. ft. = ____ cu. in.
13. 5 cu. yd. = ____ cu. ft.
14. ____ cu. ft. = $2\frac{1}{2}$ cu. yd.
15. $5\frac{1}{3}$ cu. yd. = ____ cu. ft.
16. $4\frac{3}{4}$ cu. yd. = ____ cu. ft.
17. Change $16\frac{1}{2}$ cu. ft. to cubic inches.
18. How many cubic yards are there in 428 cu. ft.?

167. Problems

What is the cost of excavating a cellar 16 ft. by 18 ft. by 12 ft. at 70¢ a cubic yard?

A. 1st Step. $16 \times 18 \times 12 = 3456$, number of cubic feet excavated

2nd Step. $3456 \div 27 = 128$, number of cubic yards excavated

3rd Step. $128 \times \$0.70 = \89.60 , cost of excavating

B. 1st Step. $\frac{16 \times \overset{2}{\cancel{18}} \times \overset{4}{\cancel{12}}}{\cancel{27} \atop \cancel{3}} = 128$, number of cubic yards

2nd Step. $128 \times \$0.70 = \89.60 , cost of excavating

In B, the dimensions of the cellar in feet were divided by the dimensions of a cubic yard expressed in feet.

1. How many cubic yards of earth were removed in digging a cellar 18 ft. long, 12 ft. wide, and 8 ft. deep?

2. What is the capacity of a tank $18\frac{1}{2}$ ft. by 15 ft. by $16\frac{1}{2}$ ft.?

3. How many cubic yards of earth were removed in digging a trench 28 ft. long, 6 ft. deep, and 4 ft. wide?

4. It costs \$2 per load to draw gravel. If the dimensions of the wagon are 9 ft. by 3 ft. by 2 ft., what is the cost per cubic yard?

5. A contractor charged \$.55 per cubic yard for excavating a cellar 25 ft. by 15 ft. by 12 ft. What was the cost of excavating?

6. How many cubic feet of cut stone and concrete are there in a wall 18 ft. long, 12 ft. high, and $3\frac{1}{2}$ ft. wide?

*7. How many cubic feet of water are there in a swimming tank 35 ft. long, 25 ft. wide, and 8 ft. 8 in. deep when the tank is $\frac{3}{4}$ full?

8. (a) The excavation for an office building is 90 ft. $\times$ 75 ft. $\times$ 24 ft. How many cubic yards of earth were removed? (b) The contractor's price was \$.75 a cubic yard. What was the cost of removing the earth?

9. A tank measures 30 ft. by 8 ft. by $5\frac{1}{2}$ ft. What is its capacity?

*10. What is the cost of digging a trench 32 in. wide, 44 in. deep, and 650 yd. long at 75¢ per cubic yard?

*11. What will it cost, at 42¢ per square foot, to lay a floor in a room 24 ft. 6 in. by 18 ft. 4 in.?

12. The excavation for the cellar of a bungalow is 34 ft. long, 26 ft. wide, and $8\frac{1}{2}$ ft. deep. (a) How many cubic yards of earth were removed in making the excavation? (b) If the contractor's price was 75¢ per cubic yard, what was the cost of removing the earth?

13. How many cubic feet are there in a storage bin 20 yd. long, 14 yd. wide, and 8 ft. high?

*14. If there are 36 cu. ft. in a ton of coal, how many tons can be stored in a bin 14' $\times$ 10' $\times$ 8'?

15. In removing stone from a quarry, an excavation 250 ft. long, 110 ft. wide, and 48 ft. deep was made. (a) How many cubic feet of stone were removed? (b) How many cubic yards?

16. Find the capacity of a packing case the inside dimensions of which are 6 ft. 6 in. by 4 ft. 6 in. by 3 ft.

*17. How many cubic feet are there in a concrete dam 40 yd. long, 10 ft. 4 in. high, and 22 in. thick?

168. Denominate Number Race

Can you score 100% on this test? Compete row against row. The score is the number right. The row having the highest average score wins.

Supply the missing numbers:

A

B

1. 2 mi. = _____ ft.
2. 1 sq. ft. 24 sq. in. = _____ sq. in.
3. _____ cu. in. = 1 cu. ft.
4. _____ ft. = $\frac{1}{2}$ mi.
5. 1.5 cu. ft. = _____ cu. in.
6. $\frac{1}{3}$ sq. yd. = _____ sq. ft.
7. .5 mi. = _____ rd.
8. _____ cu. yd. = 81 cu. ft.
9. 2 cu. yd. = _____ cu. ft.
10. _____ sq. ft. = 3 sq. yd.
11. 3250 lb. = _____ ton
12. $\frac{1}{2}$ cu. ft. = _____ cu. in.
13. _____ yd. = $\frac{1}{2}$ mi.
14. 26 qt. = _____ gal.
15. 3 T. 5 cwt. = _____ lb.
16. 1 score = _____
17. _____ rd. = 11 yd.
18. _____ units = 1 gross
19. .5 hr. = _____ min.
20. $\frac{5}{6}$ da. = _____ hr.
21. 3 sq. ft. = _____ sq. yd.
22. _____ da. = 1 leap year
23. 1 qt. = _____ gi.
24. $2\frac{1}{2}$ T. = _____ lb.
25. 2 mi. = _____ rd.

- 2 rd. = _____ ft.
- 1 sq. mi. = _____ A.
- 3 cu. yd. = _____ cu. ft.
- _____ rd. = 1 mi.
- 12 sq. ft. = _____ sq. in.
- _____ cu. yd. = 135 cu. ft.
- $\frac{1}{2}$ sq. ft. = _____ sq. in.
- _____ gal. = 46 qt.
- _____ cu. ft. = 1 cu. yd.
- 1 sq. yd. + 7 sq. ft. =
_____ sq. ft.
- _____ rd. = $\frac{5}{8}$ mi.
- _____ pt. = 2 gal.
- _____ oz. = $6\frac{1}{2}$ lb.
- 5 sq. yd. = _____ sq. ft.
- $12\frac{1}{2}$ doz. = _____ pencils.
- _____ cwt. = 800 lb.
- 1 rd. = _____ ft.
- 1 gross = _____ doz.
- _____ min. = $1\frac{3}{4}$ hr.
- 5 cu. ft. = _____ cu. in.
- $\frac{2}{3}$ yr. = _____ mo.
- 18 cu. ft. = _____ cu. yd.
- _____ yr. = 10 mo.
- $1\frac{1}{2}$ sq. ft. = _____ sq. in.
- $5\frac{1}{2}$ qt. = _____ pt.

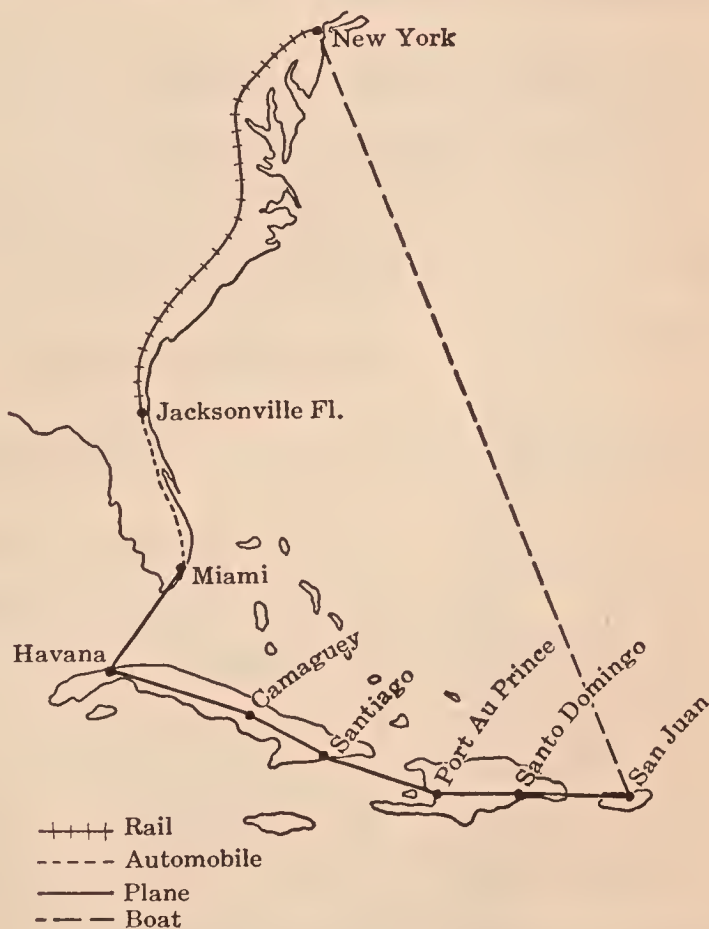
169. A Holiday in the South

The Rogers family of five took a trip to the South for a holiday this winter. Look at the map and tell how they traveled from place to place.

1. Mr. Rogers bought tickets for all his family for the trip from New York to Jacksonville, at \$36.55 each.

(a) What did he pay for tickets? Since they spent one night on the train, he had to get sleeping accommodations. He reserved a compartment at \$30.75 and two lower berths at \$10.88 each. Meals on the train averaged \$3 a day for each person. (b) What was the total cost of the railroad trip?

2. They left New York at 9.40 A.M. and reached Jacksonville at 9 A.M. the next day. How many hours did it take to make the trip?



3. Elsie looked at the time-table and noticed that their train stopped at these cities: New York, Jersey City, Newark, Philadelphia, Wilmington, Baltimore, Washington, Richmond, Charleston, Savannah, and Jacksonville. Through which states did they pass?

4. The train passed over the lines of three railroads. The following figures show the mileage on each road:

I	II	III
New York 0 mi.	Washington 0 mi.	Richmond 0 mi.
Philadelphia 91 mi.	Richmond 114 mi.	Charleston 399 mi.
Baltimore 187 mi.		Jacksonville 681 mi.
Washington 227 mi.		

- Find the total mileage on each road.
- Find the total distance from New York to Jacksonville.
- When they reached Charleston, how much of the journey remained?

5. What is the average mileage per hour from New York to Jacksonville?



The Automobile Trip

This diagram shows the road map the Rogers family followed from Jacksonville to Miami. They planned to travel only $4\frac{1}{2}$ hours each day.

1. On the first day they went as far as New Smyrna. (a) How far did they travel? (b) What was the average mileage per hour?

2. The second day they reached Ft. Pierce. What was the average mileage per hour for that day?

3. What was the average mileage per hour for the last day?

4. (a) What was the total distance traveled by automobile? (b) What was the average daily mileage?

5. When they had reached Daytona, about what part of the trip did they still have to make?

6. At Titusville, how many miles remained to be traveled?

7. Which is nearer Miami — Melbourne or Daytona? How much nearer is it?

8. How far is it from Jacksonville to (a) Daytona, (b) Palm Beach, (c) Miami?

9. The gasoline cost 24¢ a gallon. Mr. Rogers used 19 gal. (a) What was the average mileage per gallon? (b) What was the average cost per mile?

10. Make up a problem about distances between cities.

The Airplane Trip

This is the schedule followed by the Rogers family on their airplane trip:

<i>Leave</i>			<i>Arrive</i>		<i>Distance</i>
1st day	Miami	9.15 A.M.	Havana	11.30 P.M.	245 mi.
2nd day	Havana	12.15 P.M.	Camaguey	3.15 P.M.	314½ mi.
3rd day	Camaguey	3.45 P.M.	Santiago	5.25 P.M.	175 mi.
4th day	Santiago	7 A.M.	Port au Prince	10 A.M.	250 mi.
5th day	Port au Prince	10.30 A.M.	Santo Domingo	12.30 P.M.	160 mi.
6th day	Santo Domingo	1 P.M.	San Juan	4 P.M.	271½ mi.

1. From this schedule find the average mileage per hour for each day's travel.

2. (a) Find the total mileage. (b) Find the total time spent in the air. (c) Find the average mileage per hour for the trip.

3. A ticket from Miami to San Juan costs \$245. What was the total cost for the Rogers family?

4. What was the average cost per mile for one person?

5. Which islands of the West Indies did they visit?

The Steamer

The family stayed one night in San Juan and then took the steamer for New York.

1. At the end of the first day out, the ship's log read 369 knots; the second day, 358.7 knots; the third day, 371.2 knots; and the fourth day, 378.3 knots. What was the total distance in knots, or nautical miles?

2. A knot is equivalent to 1.15 statute miles. What was the distance in statute miles?

3. What was the average mileage per day? (Statute miles.)

4. At \$100 a person, what was the cost for steamer tickets?

5. How far did the Rogers family travel from the time they left New York until they returned?

6. How many days were they in making the trip?

7. What was the average mileage per day for the entire trip?

170. Commuting

Walter's family lives in Yonkers, but his father goes back and forth to New York each day to business. He travels on the railroad and uses a commutation ticket. This is a special ticket issued at a reduced rate.

Most other persons who live out of town and go to town frequently, but not daily, buy a 50-Trip Family Ticket. This also is issued at a reduced rate. It is good for one year and can be used by any member of the family.

The following is a schedule of rates between smaller cities and towns and the main railroad terminals in New York.

<i>Single Ticket</i>	<i>Commutation</i>	<i>50-Trip</i>
Floral Park \$.62	\$9.68	\$19.91
Flushing \$.34	\$7.81	\$9.63
Garden City \$.72	\$10.56	\$23.82
Corona \$.27	\$6.16	\$7.87
Jamaica \$.40	\$8.80	\$12.10
Yonkers \$.53	\$7.43	\$13.20
Glenwood \$.57	\$7.65	\$13.75
Hastings \$.69	\$8.31	\$16.72
Dobbs Ferry \$.72	\$8.47	\$17.60
Irvington \$.80	\$8.75	\$19.36

1. Mrs. Wilson lives in Floral Park. She made 50 trips to the city during the first three months of the year. (a) How much would she have saved if she had bought a 50-trip ticket? (b) About what per cent would she have saved?

2. Find the difference in cost between a 50-trip ticket and 50 single tickets to New York for persons living in (a) Garden City, (b) Jamaica, (c) Yonkers, (d) Irvington, (e) Dobbs Ferry.

3. About what per cent is saved by buying the 50-trip ticket in each case?

4. What is the difference in cost between a single ticket and the fare one way at the 50-trip rate between (a) Flushing and New York, (b) Corona and New York, (c) Glenwood and New York, and (d) Hastings and New York.

5. About what per cent of the regular cost per trip in Problem 4 is saved by buying at the 50-trip rate?

6. A person who goes to the city every day would make how many trips (a) in February? (b) In September? (c) In December?

7. Allowing 60 trips as the maximum number a commuter would be likely to make in a month, what is the cost of his passage one way to New York (a) from Irvington? (b) from Garden City? (c) from Glenwood? (d) from Jamaica?

8. A business man or woman would probably go to the city on at least 24 days of the month. How many trips would he make?

*9. Using this last figure as a basis for working out the commutation cost per trip, make a table showing the comparative costs of single tickets at the three rates.

*10. What per cent of the cost of a single ticket is the cost of a ticket bought at each of the other rates? For a half cent or more allow an extra cent. For a half per cent or more, allow an extra per cent.

*11. Mrs. Wright failed to use up her 50-trip ticket before the year was out. Upon what would her loss depend?

171. Reading a Time-Table

Robert's father lives in Mount Vernon. This shows a section of the time-table he uses.

Mi.	STATIONS	PM	PM	PM	PM	PM	PM	PM	PM	PM	PM	PM	PM	PM	PM
0	Lv G. Cent. Term.														
	Lower Level	5.05	5.10	5.13	5.20	5.24	5.27	5.30	5.40	5.41	5.42	5.47	5.56	5.56	6.03
5	Lv 125th Street.....	5.15	5.20	5.23	5.30	5.34	.....	.....	.....	5.51	5.52	.....	6.06	6.06	6.13
5	Lv 138th Street.....	5.17	5.22	5.25	.....	.....	.....	.....	.....	5.53	5.54	.....	.....	.....	6.15
7	Lv Melrose.....	.....	.....	5.27	.....	.....	.....	.....	.....	5.56	.....	6.01	.....	.....	6.17
7	Lv Morrisania.....	.....	5.26	.....	.....	.....	.....	.....	.....	5.57	.....	.....	.....	.....	6.19
8	Lv Claremont Pk.....	.....	.....	5.2	.....	.....	.....	.....	.....	5.59	.....	.....	.....	.....	6.21
8	Lv Tremont.....	.....	5.29	.....	5.38	.....	.....	.....	.....	6.02	.....	6.06	6.14	.....	6.23
9	Lv 183d Street.....	.....	.....	5.33	.....	.....	.....	.....	.....	6.04	.....	.....	.....	.....	6.26
9	Lv Fordham.....	.....	5.33	.....	5.41	.....	.....	.....	.....	.....	.....	6.10	.....	.....	6.28
10	Lv Botanical Garden..	.....	.....	5.38	5.43	.....	.....	.....	.....	.....	.....	6.12	.....	.....	6.31
11	Lv Williams Bridge...	.....	5.38	.....	5.46	.....	.....	.....	.....	6.08	.....	6.15	.....	.....	6.34
12	Lv Woodlawn.....	.....	.....	5.44	5.49	.....	.....	.....	.....	6.12	.....	6.18	.....	.....	6.37
13	Lv Wakefield.....	.....	.....	5.46	5.51	.....	.....	.....	.....	6.15	.....	6.20	.....	.....	6.39
14	Lv Mount Vernon....	5.29	5.46	5.48	5.53	5.49	.....	5.54	.....	6.18	6.07	6.23	6.26	.....	6.43

1. How far is Mount Vernon from the Grand Central Terminal?
2. What train can Robert's father take that will get him to Mount Vernon at about 5.30?
3. One night he missed the 5.30 train. Which of the later trains would get him to Mount Vernon soonest?
4. List the trains that make no stop between 125th Street and Mount Vernon.
5. These trains are called ____ trains.
6. Which train stops at every station?
7. This train is called a ____ train.
8. What is the difference in time from the Grand Central to Mount Vernon between the 5.24 and the 6.03 train?
9. Why cannot Robert's father take the 5.27 train?
10. Which other trains can he not use?
11. Kate's sister gets off at the Williams Bridge Station. Which trains stop at this station?
12. If she misses the 5.10 train, what is the next train she can take?

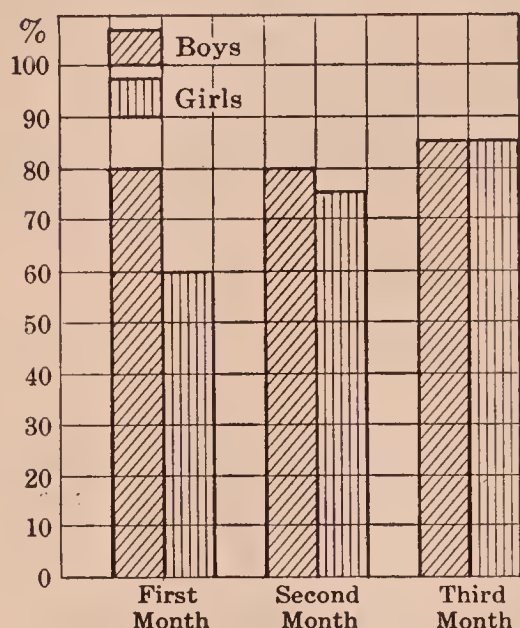
172. Showing the Results of a Competition

The boys and girls in a seventh-grade class are competing to see which group will improve most in arithmetic. They are using the group averages in monthly tests as a basis for comparison, and a bar graph similar to the one on the next page to show the results.

The graph on the blackboard was much larger, being drawn to the scale of $\frac{1}{2}$ in. for 2%. The bar showing the record of the boys was colored yellow, and the bar showing the record of the girls was colored green.

1. Which group was higher the first month? The second month? The third month?

2. What per cent did the boys make the first month? The second month? The third month?



3. What per cent did the girls make the first month? The second month? The third month?

4. What was the gain in per cent for the boys? The girls?

5. Which group improved most?

6. In which month were they tied?

173. Vocabulary Test

Complete the following statements:

1. The answer in an addition example is called the ____.
2. The numbers that are added are called ____.
3. The answer in a subtraction example is called the ____ or ____.
4. In the example $624 - 324$, the number 624 is the ____ and the number 324 is the ____.
5. To solve the example 62×348 , we use the process called ____.
6. The answer in a multiplication example is called the ____.
7. The number by which we divide is called the ____ and the number that is to be divided is called the ____.
The answer is called the ____.

8. When goods are sold for more than cost, the dealer sells at a ____.

9. When goods are sold for less than cost, the dealer sells at a ____.

10. The sign $+$ is used to indicate _____. It is read _____.

11. The sign $-$ is used to indicate _____. It is read _____.

12. The sign $\times$ is used to indicate _____. It is read _____.

13. The sign $\div$ is used to indicate _____. It is read _____.

14. There are two kinds of fractions, common and _____.

15. The terms of a fraction are the _____ and the _____.

16. In the fraction $\frac{5}{8}$, 5 is the _____ and 8 is the _____.

17. In the number $6\frac{1}{2}$, 6 is called an _____, $\frac{1}{2}$ is called a _____, and $6\frac{1}{2}$ is called a _____.

18. Write a mixed decimal.

19. When two or more fractions have the same denominator, we say they have a _____.

20. In the number 6.25, the whole number and the decimal are separated by a _____. It is read _____.

21. A fraction whose numerator is greater than its denominator is called an _____.

22. Explain "drawing to scale."

23. What is a graph?

24. A.M. means _____. M. means _____. P.M. means _____.

25. Name the instrument that shows mileage on an automobile; on a bicycle.

26. What is meant by average mileage? Average attendance? Average weight?

27. What are the factors of a number? Illustrate.

28. John said he had a balance in the bank. What did he mean?

29. Why is an estimate not an exact measurement?

30. Mary made a deposit in the bank. What does that mean?

174. Recording Your Progress in Arithmetic

You are to keep a record of your progress in arithmetic this term on a line graph.

On the next few pages in this book you will find tests which are marked Test I, II, III, IV, V, VI, VII, VIII, IX, X. There are 16 examples in each test. Try a new test every few weeks.

Each time a test is given, record on the graph the number you have right. On a larger graph your teacher will show the record of the class. Then you can compare your record with the class record.

At the end of the term your record should be higher than at the beginning of the term.

Things to Remember

If you wish to improve your score,

1. Read your examples carefully.
2. Think before you write.
3. Check your work.
4. Correct all mistakes and do some extra work on similar examples.

175. Tests

You should complete each of these tests in about 30 minutes. Work quickly, but do not hurry. Accuracy is more important than speed. Check your answers.

Test I

1. From $27\frac{3}{4}$ take $\frac{1}{4}$.

2. $\frac{2}{3} \div 5 =$

3. Multiply: 62.46
2.5

4. Five-eighths plus three-eighths =

5. $5 \times \frac{7}{8} =$

6. Of what number is 25 one-fifth?

7. Principal \$650

Time 1 yr.

Rate 6%

Interest ?

8. Find the sum:

8 ft. 4 in.

6 ft. 7 in.

4 ft. 1 in.

9. $2400 \times 6252 =$

10. 625 is ? per cent of 1250

11. $\$68.16 \div 32 =$

12. Find 18% of \$6425.

13. 8359

6426

9589

2786

4583

2784

14. 620,400

- 15,670

15. $\frac{11}{15}$ of \$61.50 =

16. Find the area of a rectangle that measures 8.4 yd. by 4.2 yd.

Test II

1. From 12 yd. 1 ft. take 9 yd. 2 ft.
2. $.3 + .6 + .8 + .5 + .8 =$
3. Find the difference between 14.875 and 200.
4. $.4 \overline{)3.628}$
5. Find the product of 8296 and .427.
6. Principal \$1800
Rate 6%
Time 3 yr.
Interest ?
7. $\frac{8}{9} + \frac{4}{9} =$
8. From 1 take $\frac{3}{8}$.
9. $1000 \times .8648 =$
10. 54 is ? per cent of 100
11. $\frac{3}{4} \times 45 =$
12. \$180 is 60% of ?
13. $10\frac{1}{2} \div 3 =$
14. Cost \$2800
Rate of gain 12%
Gain ?
15. $\begin{array}{r} 6246 \\ 3897 \\ 8469 \\ 7684 \\ 8329 \\ 6846 \\ \hline 4587 \end{array}$
16. Find the perimeter of a square that measures 7.25 yd. on a side.

Test III

1. $86.4 + 283 + .462 + 49.02 + 6.7 =$
2. Subtrahend 27,476
Minuend 58,000
Remainder ?
3. Seven-eighths plus three-fourths =
4. $18\frac{1}{3} \div 2 =$
5. 25 is ? per cent of 125
6. 9367 multiplied by 900 =
7. Multiplicand 2384
Multiplier .875
Product ?
8. $9 \overline{) .6354}$
9. $5\frac{1}{8}$ minus $\frac{1}{18} =$
10. $36 \times \frac{1}{12} =$
11. Cost \$1250
Rate of Loss 12%
Loss ?
12. $37\frac{1}{2}\%$ of ? is 360
13. Find the sum:
6 gal. 2 qt.
3 gal. 1 qt.
5 gal. 3 qt.
14. 69,876
24,508
87,604
59,837
69,859
46,849
15. Find the interest on \$24,000 for 6 months at 6%.
16. Find the area of a rectangle that measures $12\frac{1}{4}$ rd. by $9\frac{1}{3}$ rd.

Test IV

1. $62 \overline{)31,126}$
2. List price \$540
Discount 8%
Selling price ?
3. 8624
 928.6
 58.753
 9.24
 684.01
4. .5 minus .2835 =
5. $5.692 \times 436 =$
6. Divide .2 by 25.
7. $16\frac{2}{5}$ plus $28\frac{1}{6}$ plus $18\frac{2}{3} =$
8. From $18\frac{3}{7}$ take $14\frac{5}{7}$.
9. $40 \times \frac{5}{6} =$
10. What per cent of 200 is 8?
11. Of what number is 72 eight-ninths?
12. From 6 gal. 1 qt.
Take 5 gal. 3 qt.
13. Change $56\frac{2}{3}$ to an improper fraction.
14. Principal \$12,000
Time 9 mo.
Rate 5%
Amount ?
15. $12 \div \frac{4}{5} =$
16. Find the area of a triangle whose altitude is 9.6 yd. and whose base is 12.8 yd.

Test V

1.
$$\begin{array}{r} 86,245 \\ 9,286 \\ 75,826 \\ 7,896 \\ 5,687 \\ \hline 98,765 \end{array}$$
2. Find the difference between .9 and .0075.
3. Multiply 275 by 6.4.
4. How much money will \$5000 earn in 1 year 6 months at 4%?
5. Add:
$$\begin{array}{r} 6 \text{ lb. } 7 \text{ oz.} \\ 9 \text{ lb. } 8 \text{ oz.} \\ 2 \text{ lb. } 5 \text{ oz.} \\ \hline \end{array}$$
6. $2000 \times 246.3 =$
7. Find $87\frac{1}{2}\%$ of 6896.
8. 100 is ? per cent of 50
9. $.6489 \div 21 =$
10. Add:
$$\begin{array}{r} 48\frac{1}{4} \\ 12\frac{3}{5} \\ 6\frac{1}{2} \\ \hline 27 \end{array}$$
11. Multiply 8 by $\frac{11}{24}$.
12. Divide 42 by $\frac{6}{7}$.
13.
$$\begin{array}{r} 45\frac{2}{15} \\ - 26\frac{7}{15} \\ \hline \end{array}$$
14. 24 is 6% of ?
15. 4.5×1 mi. equals ____ft.
16. Find the area of a triangle that has a base of 16.8 ft. and an altitude of 8.4 ft.

Test VI

1. What amount must be paid after 60 days if I borrow \$9000 at 4%?
2. What is the volume of a rectangular solid 9 ft. long, 8 ft. wide, and 6 ft. high?
3. From 7 hr. 25 min. take 4 hr. 45 min.
4. $625 + 86.4 + 275.254 + 36.27 =$
5. $68.2 - 4.2875 =$
6.
$$\begin{array}{r} 60\frac{1}{4} \\ 27\frac{3}{8} \\ \hline 15\frac{1}{6} \end{array}$$
7. $2\frac{4}{5} \times \frac{7}{12} =$
8. $897.6 \div 1000 =$
9. Find .5% of 624.
10. What per cent of 800 is 100?
11. 8% of ? = \$24
12. How many feet are there in .75 mi.?
13. $976.4 \times .485 =$
14.
$$\begin{array}{r} 86,954 \\ 27,836 \\ 9,878 \\ 56,989 \\ 7,586 \\ \hline 88,493 \end{array}$$
15. $16\frac{1}{2} \div \frac{1}{2} =$
16. $835 \overline{)264}$

Test VII

1. $612,563 \div 76 =$
2. Multiply 70.86 by 67.8.
3. Find $\frac{1}{8}\%$ of \$1200.
4. $.66\frac{2}{3}$ of ? = 1500
5. What interest is due on \$8500 for 60 days at 4%?
6. Find the number of cubic inches in 2.5 cu.ft.
7. Find the cubical contents of a rectangular solid $8\frac{1}{2}$ ft. by $6\frac{1}{4}$ ft. by 8 ft.
8.
$$\begin{array}{r} 68.2 \\ 4.275 \\ 926. \\ 87.45 \\ 3.9875 \\ \hline 60.05 \end{array}$$
9. What is the difference between 18.006 and .24?
10. $.6298 \div 268 =$
11.

Amount of Sale	\$540
Commission	8%
Net Proceeds	?
12.
$$\begin{array}{r} 200\frac{7}{8} \\ 16\frac{1}{2} \\ 27\frac{3}{8} \\ \hline 26\frac{1}{4} \end{array}$$
13.

Minuend	$28\frac{2}{3}$
Subtrahend	$4\frac{4}{5}$
Difference	?
14. Divide $14\frac{1}{2}$ by $\frac{3}{5}$.
15. $2\frac{1}{4} \times 6\frac{1}{2} \times \frac{2}{3} =$
16. Arrange the following in order of value and find the sum: .624, 6.24, 62.4, .0624, 624.

Test VIII

1. $87\frac{1}{3}$ plus $52\frac{1}{6}$ plus $36\frac{8}{9} =$
2. Multiplicand 42
Multiplier $5\frac{6}{7}$
Product ?
3. Subtract .29 from .6826.
4. $9.6 \overline{)864}$
5. Find the product of 8764 and 8.55.
6.
$$\begin{array}{r} 9\frac{1}{3} \\ - 8\frac{7}{8} \\ \hline \end{array}$$
7. $4\frac{1}{2} \times 13\frac{1}{3} \times \frac{1}{2} =$
8. $8\frac{7}{10} \div \frac{3}{20} =$
9. Find 125% of \$1600.
10. What per cent of 56 is 35?
11. What amount is due at the end of a year if the interest on \$1500 at 4% is compounded quarterly?
12. Change 26 sq. yd. 7 sq. ft. to square feet.
13. Multiply 260 by $46\frac{5}{8}$.
14. Divide $10\frac{1}{2}$ by $5\frac{1}{4}$.
15. $905,463 \div 9 =$
16. Find the area of a square that measures $12\frac{3}{4}$ yd. on a side.

Test IX

1. 476 minus .826 =
2.
$$\begin{array}{r} 86,245 \\ 9,378 \\ 69,546 \\ 8,620 \\ 978 \\ \hline 79,876 \end{array}$$
3. Multiply:
$$\begin{array}{r} 2800.6 \\ 8.05 \\ \hline \end{array}$$
4. Divide 364 by 3.25.
5.
$$\begin{array}{r} 18\frac{2}{3} \\ \frac{1\frac{4}{5}}{1\frac{5}{5}} \\ 26\frac{3}{5} \\ \hline 75 \end{array}$$
6. Find the area of a rectangle that measures $16\frac{3}{4}$ yd. by $32\frac{1}{2}$ yd.
7. Find the difference between $26\frac{5}{8}$ and $25\frac{3}{4}$.
8. Multiply $270\frac{3}{8}$ by 15.
9. Rewrite the following numbers in order of value and find the sum: 920, 9.2, .92, .092, 92.
10. What is 2.5% of 500?
11. \$1200 is 125% of what number?
12. How many cubic inches are there in .75 cu. ft.?
13. Find the amount due on \$1600 at the end of 1 year when interest at 3% is compounded quarterly.
14. Find the cubical contents of a bin 8.4 yd. by 6.2 yd. by 3.5 yd.
15. $13\frac{1}{3} \div 1\frac{7}{9} =$
16. 27 is ? per cent of 108

Test X

$$1. \quad 826.4 + .275 + 826 \\ + 46.375 + 29.2 =$$

$$2. \quad \begin{array}{r} 43\frac{3}{4} \\ 16\frac{2}{3} \\ 15\frac{1}{12} \\ \hline 75 \end{array}$$

$$3. \quad 11\frac{1}{4} \div 4\frac{1}{2} =$$

$$4. \quad \overline{8)56,496} =$$

$$5. \quad \text{Find } \frac{1}{4}\% \text{ of } \$2400.$$

$$6. \quad 862.46 - 2.5583 =$$

$$7. \quad 36\frac{1}{5} \text{ minus } 24\frac{5}{6} =$$

$$8. \quad \text{What per cent of 80 is 50?}$$

$$9. \quad \text{Of what number is } \$950 \text{ five-sevenths?}$$

$$10. \quad .36 \overline{)5473}$$

$$11. \quad \frac{7}{8} \times 2\frac{1}{7} =$$

$$12. \quad \text{Find the amount due on } \$15,000, \text{ borrowed for 90 days at } 6\%.$$

$$13. \quad 45.96 \text{ multiplied by } 2400 =$$

$$14. \quad \text{Find the volume of a rectangular solid measuring } 3\frac{1}{4} \text{ ft. by } 2\frac{2}{3} \text{ ft. by } 4\frac{1}{2} \text{ ft.}$$

$$15. \quad \text{Find the area of a triangle having a base of 53.2 yd. and an altitude of 26.5 yd.}$$

$$16. \quad \text{How many cubic yards are there in 21.6 cu. ft.?$$

176. Tables of Measure**Linear Measure**

12 inches (in.) = 1 foot (ft.)

3 feet = 1 yard (yd.)

$5\frac{1}{2}$ yards or $16\frac{1}{2}$ ft. = 1 rod (rd.)

320 rods or 5280 ft. = 1 mile (mi.)

Square Measure

144 square inches (sq. in.) = 1 square foot (sq. ft.)

9 square feet = 1 square yard (sq. yd.)

$30\frac{1}{4}$ square yards = 1 square rod (sq. rd.)

160 square rods = 1 acre (A.)

640 acres = 1 square mile (sq. mi.)

Measures of Volume

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.)

27 cubic feet = 1 cubic yard (cu. yd.)

128 cubic feet = 1 cord

Measures of Weight

16 ounces (oz.) = 1 pound (lb.)

100 pounds = 1 hundredweight (cwt.)

2000 pounds = 1 ton (T.)

Liquid Measure

4 gills (gi.) = 1 pint (pt.)

2 pints = 1 quart (qt.)

4 quarts = 1 gallon (gal.)

Dry Measure

2 pints (pt.) = 1 quart (qt.)

8 quarts = 1 peck (pk.)

4 pecks = 1 bushel (bu.)

Table of Time

60 seconds (sec.) = 1 minute (min.)

60 minutes = 1 hour (hr.)

24 hours = 1 day (da.)

7 days = 1 week (wk.)

30 days = 1 month (mo.)

365 days = 1 year (yr.)

366 days = 1 leap year

Table of Number

12 units = 1 dozen (doz.)

12 dozen = 1 gross (gr.)

12 gross = 1 great gross

20 units = 1 score

United States Money

10 mills = 1 cent (¢)

10 cents = 1 dime

10 dimes = 1 dollar (\$)

Equivalents

- 1 gallon of water = $8\frac{1}{2}$ pounds
- 1 gallon = 231 cubic inches
- 1 cubic foot of water = $62\frac{1}{2}$ pounds
- 1 cubic foot = $7\frac{1}{2}$ gallons
- 1 bushel = $1\frac{1}{4}$ cubic feet
- 1 bushel of wheat = 60 pounds
- 1 bushel of corn = 56 pounds
- 1 bushel of oats = 32 pounds
- 1 load of earth = 1 cubic yard
- 1760 yards = 1 mile
- 1 hand = 4 inches
- 1 fathom = 6 feet
- 1 knot = 1.15 miles (nearly)
- 1 section = 1 square mile
- 1 square = 100 square feet
- 1 hogshead = 63 gallons

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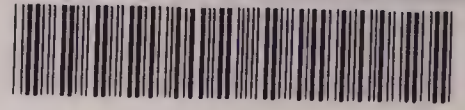
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